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**All communications to be addressed:**

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CLARENCE GOODE,

*Minister of Agriculture.*

# POINTS FOR PRODUCERS.

## Stock Diseases.

In order to prevent any confusion in the minds of stock owners as to their responsibility under the provisions of the Stock Diseases Act, attention is drawn to the following diseases which have been proclaimed as notifiable:—Actinomycosis, anthrax, cancer, catarrh, dourine (or equine syphilis), equine fever, epizootic lymphangitis, farcy, foot and mouth disease, glanders, lice, pants (or contagious penumonia affecting swine), pleuro-pneumonia, rabies, rinderpest, scab, sheep pox, surra, swine fever, tick fever, trichinosis, tuberculosis. All suspected cases of any of the above diseases should be immediately reported to the Chief Inspector of Stock, Adelaide. Request for advice on stock complaints, not suspected of being contagious, and other veterinary advice through the medium of the *Journal of Agriculture,* should be addressed to the *"Editor."* This course is advised as letters or telegrams addressed to the Government Veterinary Lecturer, either by name or title, may be left unattended for several days whilst that officer is away in the country.

## Agricultural Bureau Fixtures.

The Annual Conference of Branches of the Agricultural Bureau situated in the areas served by the Pinnaroo and Brown's Well railway lines is to be held at Tailem Bend on Thursday, August 31st. Sessions will be held at 3.30 in the afternoon and 7.30 in the evening, addresses being delivered by officers of the Department, and papers read by members of the different Branches.

## Congress.

The Annual Congress (which was abandoned last year) is to take place in Adelaide on the 4th, 5th, and 6th September, and a large number of questions of vital interest to agriculturists is included in the agenda.

## Imports and Exports of Plants, Fruits, &c.

During the month of June, 1916, 943bush. of fresh fruits, 15,326bush. of bananas, 26,695 bags potatoes, 1,480 bags of onions, and 196 packages of plants, seeds, and bulbs were examined and admitted at Adelaide and Port Adelaide under the "Vine, Fruit, and Vegetable Protection Acts of 1885 and 1910"; 303bush. of bananas (over ripe) were destroyed. Under the Federal Quarantine Act, 827 packages of plants, seeds, and bulbs were examined and admitted from oversea sources. Under the Federal Commerce Act, 356 cases of fresh fruits, 2,270 packages of dried fruits, and 7 packages of plants were exported to oversea markets. These were consigned as follows:—For London—17 cases citrus fruit; New Zealand—39 cases citrus fruit, 2,270 packages of dried fruit, and 7 packages of plants.

### Sarcosporidiosis.

A disease of somewhat frequent occurrence in certain parts of the State, and one that has caused sheepowners a good deal of trouble, and, in cases, loss, is described by the Government Veterinary Lecturer (Mr: F. E. Place, B.V.Sc., M.R.C.V.S.) as sarcosporidiosis. In a particular case brought under notice by a correspondent, the animals affected were six-tooth ewes, heavy in lamb, fat, but not too fat. They stood about alone, appeared stiff, and lost the use of the hind legs; got down, were unable to rise or stand when lifted, and subsequently died. "The symptoms, so well described, point to the disease known as sarcosporidiosis," said Mr. Place, in replying. "It is due to a microscopic parasite in the blood cells, which exists, apart from sheep, on the lower leaves of herbage such as grass or dandelion in damp condition. It affects animals that are beginning to thrive as described above, and the preventive is to constantly change pasturage every few days, keeping them off any one for a week if possible. Bleeding at the eye vein is useful, and if they are being fed, half an ounce of sulphur per sheep in the feed would do good. For those affected try 10 drops tr. nux vomica three times a day. Ewes carrying twin lambs are very frequently affected."

* * *

# INQUIRY DEPARTMENT.

**Any questions relating to methods of agriculture, horticulture, viticulture, dairying, &c., diseases of stock and poultry, insect and fungoid pests, the export of produce, and similar subjects, will be referred to the Government experts, and replies will be published in these pages for the benefit of producers generally. The name and address of the inquirer must accompany each question. Inquiries received from the question-boxes established by Branches of the Agricultural Bureau will be similarly dealt with. All correspondence should be addressed to "The Editor, *The Journal of Agriculture*, Adelaide."**

## VETERINARY INQUIRIES.

[Replies supplied by Mr. F. E. Place, B.V.Sc., M.R.C.V.S., Veterinary Lecturer.]

"J. A. C.," Kadina, reports a cow with hard, horny substance on top of ribs near loin.

Reply—This is not likely to hurt the milk, being probably of a warty nature, and would be better removed a week or two after calving. If it has a root tie a strand of horsehair tightly round it, and when it has fallen off dry it up with a little alum applied daily. If there is no root it would be better to have it cut off, in which case it would bleed somewhat, and should be seared with a red hot iron.

"W. A. T.," Cummins, seeks information *re* crossing and mating sows, and also in regard to providing cows in milk with bonemeal.

Reply—A sow pure bred, if mated to a pure-bred boar, then has litter by crossbred, is then returned to pure bred, will in all probability throw purebred pigs, but may show cross marks in some. Yorkshire sow has festers on ears, the oats are probably too heating, and it would be well to give her a course of green feed, also a teaspoon of sulphur and a handful of charcoal in feed twice a day for a week or ten days. She would be better if having charcoal or cinders regularly. Some people put the sow on the eighth day after farrowing, but the writer believes it is more profitable to mate her between the fourth and eighth day after weaning, she is a better mother in the latter case. In districts where dry bible is prevalent it is well to have a lick handy for cows to get at, consisting of four parts bonemeal and one part saltpetre. If not given as a lick a handful may be scattered over the feed once a day. In some parts of New Zealand this is a regular custom.

"A. J. D.," Willaston, had a foal with thick navel, not parted, tied and cut.

Reply—The probability is that by this time the cord will have shrivelled up all right; if not paint it with tincture iodine once or twice. On a future occasion do this at once when cut, and do not cut more than 4in. to 5in. long.

"S. E. P.," Pinnaroo, had a gelding, nine years, poor and weak, seemed better in light work.

Reply—The probability is stomach worms, such as bots, &c. The veterinary lecturer was at Pinnaroo on the 12th inst., and would have been glad to have seen the animal; it is an advantage to be a member of the Agricultural Bureau, and so have notice of such visits. Keep the horse overnight without food, then give a pint of warm milk in which half a teacup of oxgall is dissolved, follow this an hour later with a pint of raw linseed oil and two tablespoons of turpentine. Then give twice daily in food a tablespoon of the following powder:—Sulphate of iron, sulphur, black antimony, gentian, of each ¼lb., linseed meal and brown sugar of each 1lb. Kindly report progress at the end of three weeks.

"G. A. A.," Wilkawatt, asks treatment for pigs which are lousy.

Reply—The question has been answered many times in these columns. The treatment you have given is all right, but you might find a good sheep dip used as a spray more effective. Afterwards keep the pigs well oiled with any cheap bland oil. It is no good treating the pigs unless the sties are also sprayed with disinfectant such as sheep dip, as the vermin harbor in crevices. Speaking generally, in the mallee it would be better to evacuate them and put up fresh ones at a distance. Affected pigs require treatment about once a fortnight until free.

"B. Bros," Winninowie, have a gelding, 19 years, eats fairly well, but loses condition.

Reply—Examine teeth, especially the last back ones, and report condition. Give a tablespoon of the following powder twice a day in feed for a fortnight:—¼lb. each sulphate of iron, sulphur, saltpetre, ground fennel seed, 1lb. each sugar and linseed meal.

"S.," Coorabie, has a colt, four years, with thick stinking yellow discharge of nostril, otherwise in good health.

Reply—This appears to be probably a case of ozæna arising from an abscess in the dental sinus following dentition. Give a dose or two of snuff to dislodge matter, steam with a teaspoonful of eucalyptus oil, and syringe with Condy's crystals solution of pink color, about as much as will lie on a 3d. bit to half a gallon of water. It is quite probable that this will not cure, but a report after three weeks' treatment will be esteemed, and further treatment suggested.

"J. M.," Canowie Belt, has horses with scurfy legs, raw and cracking.

Reply—The trouble is chorioptic mange, as in the previous cases, and will yield to the same treatment—benzine and oil with sulphur internally. In bad cracking it may be well to use, in addition, a lotion made of ½oz. each of sugar of lead and sulphate of zinc in half a pint of water with half a pint of methylated spirit added.

"W. A. S.," Geranium, has a cow 10 years, down, unable to rise; seven hours before calving jumped fence; dung and water passed while down.

Reply—The symptoms, especially the extension of the hind legs, point to injury of the spine, and the passing of dung and water rather put milk fever out of court, so that it is probable nothing would have saved her, as the injury was most likely fracture of a vertebra. In addition to the one-third milk and water and pollard give the calf a handful of linseed jelly, made by boiling linseed or linseed meal till it has taken up all the water used. A little rice is useful if the calf should scour.

"W. S.," Verran, had a gelding, nine years, taken ill about 4 p.m. in plough, very severe pain, and died; breathing very labored at end.

Reply—The most probable cause of death was rupture of the diaphragm, due to working heavily on a full stomach, retention of urine is a symptom of this condition. The soda and ginger would have done more good than the saltpetre, but the dose given, about an ounce, though large, would not do harm. Nothing would have saved the animal.

"C. O. R.," Julia, has bay mare two years, with lumps on shoulder after feeding 6lbs. oats.

Reply—Six lbs. oats a day is not too much by any means, but combined with grainy chaff may supply too much nourishment, and the lymphatics of the skin may have to try and get rid of such by breaking out into little lumps as described. A flat tablespoon of sulphur once a day in feed for a week will probably put matters right. For various substitutional rations see the very excellent tables published in last year's *Journal of Agriculture* by the Director of Agriculture, and available in leaflet form.

"S. C. B.," Crystal Brook, had a stallion, 11 years, which after hard day's work refused feed, colic pains ensued, three hours later sat up at intervals like a cat, shoulders twitching, next morning fell over, then walked round for two minutes, fell over and died.

Reply—The symptoms well described; all point to rupture of the stomach, which is frequent in horses of the above description, and generally results from abscesses brought about by the worm *habronema equi*. No treatment would have been of any avail.

"P. A. W." Wirrabara, seeks information *re* feeding a stallion.

Reply—A reference to last year's replies will give rations, also the excellent rations suggested by the Director of Agriculture in the same *Journal*. Linseed is not desirable for a stallion in service, and 5lbs. of boiled barley daily will have a better effect both on coat and vigor.

''C. W.,'' Whitwarta, has a mare with hollow inside wall of hoof filled with dry black powder; has been opened and now no lameness.

Reply—The condition is due to an old standing injury, and the treatment has been correct so far, but it will be as well to stuff the opening with beeswax, or better, plasticine, and blister the lump at top of hoof. Keep the wall dressed with Stockholm tar, and kindly report progress after a month.

''W. N. B.,'' Tintinara, states that cow in calf five months, just dried off, paddock and feed, went off feed, lost cud, frothed at mouth, nose dry, twitching at flanks like poisoned dog, swaying, and labored breathing.

Reply—The symptoms certainly point to poisoning, and although up to the present there is no evidence of cattle being affected like horses with ''cress,'' yet that weed produces such symptoms. The bones of poisoned foxes also have been credited with retaining toxic properties, and the symptoms would simulate those of phosphoric acid poisoning also, but if there were fresh strychnine baits the cow could get at, they would be a more likely cause.

''H. H. R.,'' Edillilie, states that a gelding, four years, was affected with colic, improved after course of arsenic, fell away again, and urine became thick and dark.

Reply—The trouble, as you suggest, is bloodworms, and the parasites not infrequently occupy the blood vessels of the kidneys, producing the symptoms you name. It would be well to give another course of the Fowler's solution of arsenic, and follow it with a tablespoon daily of a powder made of sulphate of iron, sulphur, saltpetre, thymol, of each ¼lb., sugar, linseed meal, of each 1lb.

''J. G.,'' Clare, reports that a mare, four years, had high fever, died; spleen enlarged as a yellow-greenish mass.

Reply—The cause of death was a splenic abscess, which is most frequently brought about by invasion of the minute worm known as *Habronema equi*. Treatment in such a case would have been of no avail. The condition is not infectious in the general sense of the word, but all such conditions are better treated with caution, and parts buried in lime or burnt. The functions of the spleen are still more or less of a mystery to physiologists, but it is known to be a repairer of blood cells, and a regulator of blood supply during digestion; it is sometimes called the digestive heart.

''M. S.,'' Bute, reports a mare, 14 years, stiff in front quarters, worse off, muscles shake and quiver.

Reply—The symptoms seem to point to congestion of the laminæ of the feet, and it would be well to dress the hoofs every day with Stockholm tar and to give 10 drops of tincture aconite on the tongue morning and evening for 10 days. A report at the end of the time will be esteemed.

''J. S.,'' Hawker, reports (*a*) mare passing stones with dung; (*b*) horse with white speck and matter in eye, blind.

Reply—(*a*) Continue linseed and molasses, which will keep the bowels loose, give 4ozs. of Epsom salts in feed for three evenings, then stop a week and repeat; also give morning and evening on the tongue 10 drops tincture nux vomica. As long as the stones pass they will do no harm, but if they lodge in the bend of the bowel then they will set up serious mischief. (*b*) The eye has been injured by a prickle or bit of chaff, but as it is improving the following treatment will be all that is necessary:—Blow in a small pinch of boracic acid once or twice a week. If the lens is injured the blindness will be permanent, but if it is only on the corner, then it will gradually go off.

''E. M.,'' Meribah, reports (*a*) horse gone over on hind legs; and (*b*) filly with lump on side of hock.

Reply—(*a*) It is to be feared that nothing but a very doubtful surgical operation will do any good, and in an old animal it is not worth while going to such expense, so beyond rubbing in a stimulating liniment, such as the one in the ''Medicine Shelf'' daily; nothing much can be done. (*b*) The lump is probably a thoroughpin, and it would be well to blister it with biniodide of mercury 1 drachm, lard 7 drachms, using a quarter of the quantity every three weeks.

"G. J. P.," Butler, states that a cow went off feed and dry in three days; no pain, stiff in getting up, died in three weeks.

Reply—The symptoms and the p.m. all point to inflammation of the pleura, of which the cow died. The heart was involved secondarily. The water and the rotten fat were the products of inflammatory action, although it would seem to a layman that there was none. Probably no treatment would have done any good.

"S. Bros.," Murat Bay, have a mare, 14 years, moping, and off feed and grinds teeth, continually losing small quantities of water.

Reply—It is very difficult to say what is the matter without seeing the mare, but it would seem that she has an internal growth, tumor or abscess, and she is not likely to mend so as to be profitable; give her a ball once a day containing the following:—Aloes 1 drachm, resin 1 drachm, saltpetre 1 drachm, soft soap ½oz., contine for six days, and if there is improvement report again, when a change of treatment will be suggested.

"E. G. J.," Port Adelaide, has pony mare, four years; teething and poor appetite.

Reply—Glad to hear that the treatment has done good, and it is now time to change it. Give a tablespoon of syrup of phosphate of iron twice a day, she will probably lick it off a spoon; if not mix with a little molasses and put on the tongue or in feed. Twice a week give a tablespoon of sulphur in feed. She will soon begin to pick up, and a later report will be esteemed.

"E. C.," Parilla, seeks information in regard to treatment of parasites in stock.

Reply—Most of the information desired will be found in a paper by myself on "Common Parasites," read before the Congress in Adelaide, in 1912, and printed in the *Journal of Agriculture.* Gid in sheep is caused by the *Coenurus cerebralis*, the cystic form of *Taenia coenurus* of the dog, who passes the mature segments and the ova are picked up by sheep, the shells dissolved by the gastic juice, and the embryos set free, some lodge in the skull, and in eight to 20 days the symptoms develop. Sheep feeble with brain symptoms, blind, circling, &c. Treatment—Find soft spot on skull, trephine. Prevention—Do not let dogs, foxes, &c., devour affected sheep. Dogs and like animals are the chief disseminators of many kinds of worms, especially those affecting sheep, cattle, pigs, and human beings, and should be kept off raw offal as far as possible and dosed every quarter for worms, as often advised in these replies. In-breeding in pigs—This has been dealt with in other recent replies. In-breeding judiciously is necessary in building up a herd, but in-breeding mongrels will accentuate their bad points.

"M. E. M.," Hornsdale, has a blood mare with staked off foreleg, between knee and fetlock, abscess rose and was lanced, mare very lame, lump hard and tender, after a ride of 204 miles lump broke and blood oozed.

Reply—The covering of the bone has been injured by the stake periostitis, and possibly there is a splinter still in. It would be advisable to blister with biniodide of mercury 1 drachm, lard 7 drachms, and spell for a month after, when a further report would be esteemed.

"W. N. B.," Tintinara, reports that ewes go sleepy, lose condition. P.M.—Liver yellowish and lumpy, the lumps being white and hard. The belly and heart bag full of water, heart flabby.

Reply—The condition of the liver points to fluke, or bladder worm, *Cysticercus tenuicollis*, the watery condition of the belly and chest to *Sarcosporidiosis*. The heart is always hollow, but should be hard muscle, not flabby. The parasites are spread by dogs and vermin. Treatment—Change pasture every few days, do not allow sheep to bite tight, hand feed with a little chaff, give Cooper's worm tablets (Elder, Smith) to the affected ones; do not let dogs or foxes get at offal.

"E. L. P.," Mindarie, seeks cause of white hairs, due to collar or saddle pressure, and information *re* broken wind.

Reply—(*a*) The whiteness of the hair is due to destruction of the pigment cells at the root of the hair by pressure, and may be avoided by leaving saddle or collar on loosely till dry and then well hand-rubbing the part and dressing after with methylated spirit. Once formed, dyeing is the only way of doing away with the whiteness, which, however, is no harm. (*b*) It is extremely unlikely that the colt is broken-winded—*Emphysematous*—as such a condition is mostly associated with hard work. But he may have any of the dozen and one complaints of the lungs and air passages which would cause a difficulty in breathing. The method of detection would vary with the disease, so cannot be detailed.

"W. Bros.," Yeelanna, report that a cow has fallen off in milk, dull, lazy; does not care for bonemeal.

Reply—The symptoms point to indigestion. Try her with 1lb. of Epsom salts in a quart of warm beer with an ounce of sulphur and half an ounce of ginger added. Follow this by 10 drops tincture nux vomica morning and evening for 10 days, and kindly report progress, quoting 1964.

"W. Bros.," Yeelanna, have foal, mopey, hanging head, sheath swollen; sand shifted with milk and honey, and two white worms by powder.

Reply—Thanks for putting inquiries on separate sheets, it much facilitates reference and filing. The foal has both long worms (*Ascarides*) and bloodworms (*Sclerostoma*). He would probably benefit by getting a tablespoon of Fowler's solution of arsenic once daily for a fortnight, stop a fortnight, and repeat for another. Do not castrate him for several months after apparent recovery or he will probably die. A later report will be esteemed.

"J. F. C.," Edillilie, has a gelding, 18 months, which passed bloodworms after treatment for sand, then penis swelled.

Reply—The swelling of the penis is due to the toxins produced by the bloodworms, and he will do well on a tablespoon of Fowler's solution of arsenic, obtainable at the Port Lincoln chemist's, given once a day in a little bran. Give for a fortnight, stop for a fortnight, and repeat another fortnight. Local treatment of the penis may be necessary. First sling, by sewing a bran bag over loins; scarify if as big as a man's thigh, dress in any case with camphorated oil, camphor 1, olive oil 8 parts. A later progress report will be esteemed.

"R. J. R.," Edillilie, has gelding eight years, drenched with oil, turpentine, and kerosine, left off eating, died; lungs full of froth, and sand in bowel.

Reply—Was like many others, killed by kindness. The drench went the wrong way, and set up broncho-pneumonia, which was worse than worms and sand. The worms would have quitted naturally on green feed, which was why you began to see them, and the sand might have been shifted with milk and honey as so often prescribed, and no pneumonia followed, even if it had gone into the lungs. Never continue to drench a horse that coughs and never keep the head up high.

"A. S.," Naracoorte, reports cow with possible dislocation of the stifle.

Reply—If the patella is really displaced the leg will stick out behind, and she will not be able to bring it forward, if there is only a lameness and clicking noise, it is rheumatic arthritis. In the former case put a loop of rope round the neck and pass the line round the affected leg fetlock, and draw the leg up till the foot is near the elbow, then try to replace the patella by pushing it upwards and inwards till it goes into place with a click, leave the leg roped up for an hour or so, and apply a blister composed of 1 drachm biniodide of mercury and 7 drachms lard. In the second case apply the blister only over the joint, rubbing it well in for 10 minutes.

* * *

# RUST OF WHEAT.

[The first of a series of three University Extension Lectures, dealing with Plants and Disease, delivered by Professor T. G. B. Osborn, M.Sc. (Manch).]

I feel some apology necessary for venturing to lecture in such a time as this, when all thoughts are turned to war and bloodshed, upon so peaceful a subject as plants. Yet the ultimate foundation of our civilisation has rested upon the progress that the human race has made from a condition of nomadic hunters, using such vegetable food as chance provided, to a race living in a settled abode, and growing the food necessary for its support. In the words of the motto used by a famous Agricultural Department, "Agriculture is the foundation of industry and commerce," and it is to these we turn, in the hope of restoring the devastation of the present struggle. In a sense, too, my subject deals with a war, one of age-long continuance, but one that the increase of our knowledge has rendered decreasingly harmful, and not increasingly frightful.

## EARLY REFERENCES TO RUST DISEASE.

Probably, so soon as man began to grow crops, he became aware of the fact that there were times and seasons when his efforts at cultivation were brought to nought by some unaccountable agency. What more natural than that he should attribute the mystery to some wrathful God? So we find that the writers of the Book of Deuteronomy class "blasting and mildew" among the punishments inflicted upon a disobedient people by the offended Deity. It is my object, in this course of lectures, to place before you a few of the aspects of one of the newest of sciences—that of phytopathology—the study of plant diseases. By way of introduction, we shall, in this first lecture, consider one of the most widespread of plant maladies—rust of wheat.

Just as many human diseases are caused by germs invading the system, so we find that most plant diseases are caused in a similar way. Most of these germs causing disease amongst animals and plants are themselves plants, which live at the expense of the individual they attack, and are therefore known as parasites. The simplest of these parasites are bacteria, which cause diseases such as typhoid, diphtheria, and pneumonia in man, and wet rot of potatoes in plants. Fungi are a class of more highly organised parasites. They do not usually attack animals, though thrush and ringworm are due to fungi. However, fungi are responsible for a very large proportion of plant diseases. The fungus causing rust of wheat has been deliberately chosen as a type for this lecture, since few parasitic fungi are better known, and no group of organisms has proved of more importance to the biologist than these, because his study of them has disclosed so much concerning parasitism in general. The history of this disease goes back to remote antiquity. Whatever may have been the nature of the pestilence, "blasting and mildew" of crops referred to by Solomon in his prayer at the dedication of the temple, about B.C. 950, there is little doubt that the *crysybe* of the Greek authors was identical with our wheat rust. One of the earliest accounts given is that by Theophrastus, B.C. 300, who notes that *crysybe* was most prevalent in hollow places protected from the wind. If his observations upon the position of an outbreak in a crop were accurate, his attempted explanations were less happy. Rust to him was a kind of putrefaction, induced largely by the heat of the sun acting upon leaves still damp with rain. This view was prevalent in the time of Pliny, A.D. 30, who held, however, that frost caused the trouble. Ovid gives us an account of the annual Roman ceremony of the Rubigalia, when sacrifices of incense, the entrails of a sheep and a red dog were offered to the rust god. However fascinating the account of such a sacrifice may be to a student of antiquities or comparative religions, no one to-day would place any reliance on such a method of combating the disease. It was not until the 18th century that a fungus organism was discovered on rusty wheat. This is not to be wondered at, for without the aid of a microscope the fungus cannot be seen, and the microscope was not used in the study of plants at all until late in the 17th century. Even after the microscope came into use, and the fungus had been seen on rusted wheat, its relation to the disease was not clearly understood; for botanists had but the vaguest ideas of what fungi were, classing them with those organisms that—"Without parent, by spontaneous birth, Rise the first specks of animated earth." It is, in fact, but little more than 50 years since the full life-story of the rust fungus was first discovered by the great botanist de Bary, who, for many reasons, may be counted as the founder of the serious study of fungus diseases of plants.

## DESCRIPTION OF THE FUNGUS.

Almost at any time during the wheat-growing season there may be observed, as the result of careful search, yellowish patches upon the fresh green of the leaves. Sometimes they become very abundant, extending as the season advances even to the stem and ears. These patches, at first small, become larger and more numerous, while there is formed from them a fine powder. This is seen to consist of innumerable yellow-red granules, or spores, called the uredospores, from a Greek word, "to burn or shrivel up." If a section be made through a wheat leaf, it is seen that between the cells of the leaf there are numbers of fine, colorless threads—the fungus. These fungus threads (*hyphae*) live at the expense of the green cells of the leaf, from which they steal the food substances manufactured by them. Eventually increasing in number, they become clustered below the leaf skin. There the ends of the *hyphae* swell, and ultimately bud off the ovoid uredospore. The accumulation of countless threads budding off spores eventually causes the leaf skin to burst, and the spores are set free. Each spore consists of a little cell, about one-thousandth of an inch long, with a rather thick spiny wall, which, however, has three or four thin spots in a band across the middle. You may think of the spore as an infectious germ, or, if you will, as the fungus seed.

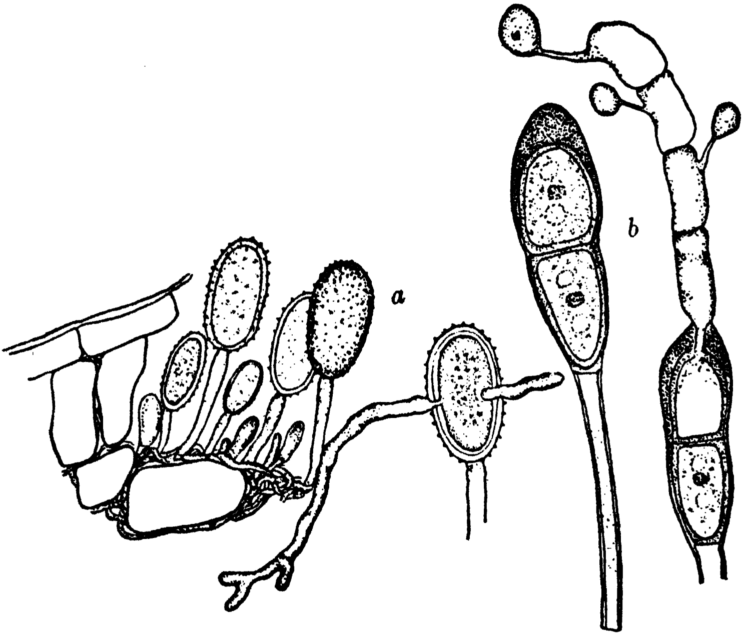

FIG. 1.—*Puccinia graminis.* *a.* Cluster of uredospores emerging from wheat leaf. A single spore is shown on a larger scale with two germ tubes. *b.* Two teleutospores; the one to the right has germinated and is forming the small spores that produce infection of the barberry leaf. All highly magnified. ("From "Fungus Diseases of Plants," by B. M. Duggar, Pub. Ginn & Co.).

When these uredospores are taken fresh from wheat, and placed in a drop of water, they begin to sprout, by sending out one or more thin tubes at the spots mentioned. These are the germ tubes, one of which outstrips the others in length, and in a few hours develops a delicate branched thread, some 10 or 12 times the length of the spore. If it remains in water it soon dies, for it has no great amount of food on which to draw. If, however, this development has taken place upon the surface of a wheat leaf, the tip of the germ tube finds its way to one of the breathing pores that occur plentifully in the leaf skin. Here the germ tube swells a little above the two cells, guarding the pore or stoma, and then continues its growth through the pore into the tissues of the leaf. There it rapidly grows, branches freely, and absorbs the food from the leaf by means of little suckers that it pushes into the cells, thus forming a new centre of infection. The countless thousands of uredospores formed may all infect leaves, provided there be sufficient moisture, in the form of rain or dew, for them to germinate in. Thus it will be seen that there may be times when the fungus rapidly increases in amount, as a result of certain weather conditions

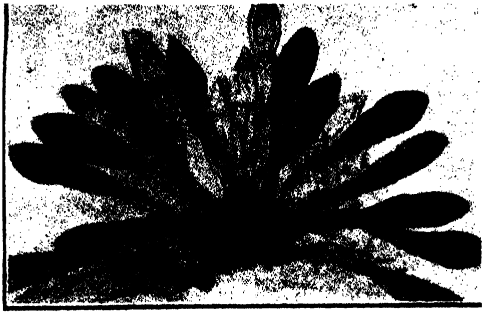

Fig 2.—Microphotograph of a cluster of teleutospores of *P. graminis*, magnified about 260 times. (From "The Rusts of Australia," by D. McAlpine, published by Victorian Department of Agriculture.)

—a point to which we return later. As the season progresses, the flecks of yellowish-red uredospores appear much darker in color—become a blackish brown. If such a patch be examined, it is seen that mingled with the uredospores, or even wholly replacing them, there is a new kind of spore altogether. This is a more elongate structure; it is seen to consist of two cells, having much thicker walls, and each cell having only one inconspicuous germ pore. The spores are so different that at one time they were thought to belong to an entirely different fungus. Now, however, they are known to be a part of the life-story of the rust fungus. Because they occur towards the close of the wheat-growing season, they are known as the teleutospores, or end-spores. Not only do they differ so completely from the uredospores in appearance, but they behave in an entirely different manner.

When taken fresh from the wheat plant, and placed in water, they will not show any signs of germination, nor can they be induced to grow for some months. But in the European spring (I shall consider the special Australian conditions in a moment) they begin to show signs of activity. They do not germinate in the same way as the uredospores, but put out a short tube, which segments into four parts. Each segment puts out a very delicate peg-like branch, which in the course of a few hours swells at its end to form a minute spherical spore. Now, the remarkable thing is this, that neither the teleutospore itself, nor the little spores that it produces on germination, has the least effect upon a wheat plant. All attempts to induce rust by sowing them on wheat leaves or young plants have been quite fruitless. What, then is the use of them?

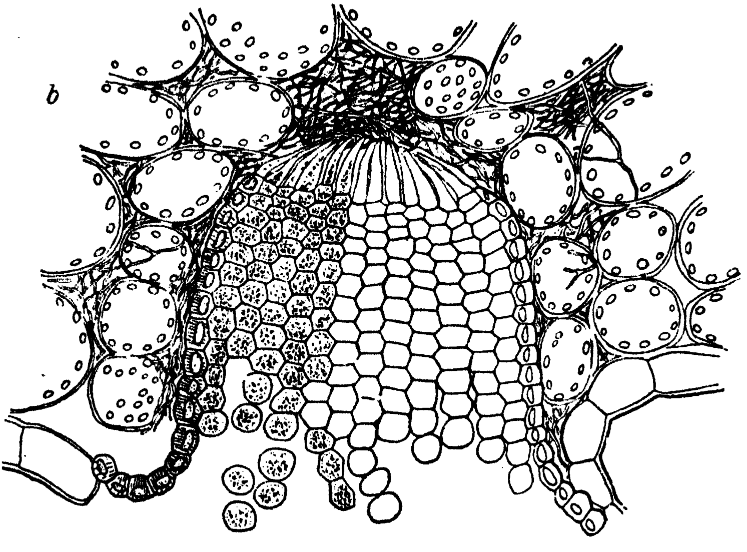

Fig. 3.—Section through cluster-cup stage of *P. graminis* on barberry, showing the chains of spores formed in the fructification. These spores produce infection on the wheat plant. Highly magnified. (*After Ward.*)

### Role of the Barberry.

There grows in North Europe a rather ornamental shrub, with prickly leaves and yellow flowers, sometimes the leaves are beautifully reddish. It has been used as a hedge plant, and more often occurs in gardens. It is the barberry. The leaves of the shrub are occasionally found to be deformed, with yellowish, thickened patches. These are caused by a fungus, which lives between the cells of the leaf, the irritation of its presence causing it to become unusually thick. The fungus has hardly a single point of resemblance to that causing wheat rust. On the lower surface of the leaf there is to be seen a number of cuplike depressions—cluster cups—from which the yellow spores are freed. The spores formed are somewhat like the uredospores on wheat in color and shape, but more spherical; moreover, they are formed in chains in the cup, and not each on its own stalk. For more than 50 years before de Bary's time it had been surmised that the barberry bush had some mysterious connection with wheat rust, but no one knew how. When, in 1854, he announced that teleutospores of wheat rust sown on barberry leaves produced the cluster cup fungus, most people received the statement with scepticism, and some with open derision. The following year he was able to show that spores formed in the cluster cups infected the wheat leaf, producing rust disease. The wheat rust fungus was thus shown to attack two different plants in the course of its life. The early part of its life is spent on the wheat plant, and when the wheat dies down, after a rest it passes on to the barberry, there to complete its life and produce the spores which infect the wheat crop of the next season. Thus the barberry acts as a kind of intermediary, starting the rust fungus in the spring, between one wheat season and the next.

That a parasitic organism should live on two widely different plants in this way was then—in de Bary's time—an unheard of thing. Now, however, the idea is much less strange, and in animal diseases especially people are familiar with it. Malaria is one of the best-known cases in point. The fever is caused in man by a parasitic organism that lives in the red cells of the human blood. There it increases and multiplies, causing fever, and ague, and other symptoms in the victim; but the parasite cannot get out of its victim's blood, and so infect anyone else. When, however, the patient is bitten by the anophiles mosquito, the insect ingests along with the blood the parasitic organism. In the mosquito the malaria germs take on a new shape and method of behavior. Ultimately they form little spores, so minute that they are carried by the mosquito's saliva into another man when the insect takes a fresh meal. The spread of malaria can be prevented by (*a*) preventing the mosquito from biting a patient, and so spreading the disease; or (*b*) a more sure way—exterminating the mosquito. The latter course has been adopted with signal success in places such as the Panama canal zone, where malaria was formerly rampant. The part played by the barberry in spreading rust may be compared with that played by the mosquito. It may be well thought that the control and final elimination of wheat rust would be a simple matter, as the elimination of malaria from an infected spot. Exterminate all barberry bushes, and there is nothing for the spores formed by the teleutospores to infect. Hence no cluster cups can form, and there are none of their spores to infect the wheat in the spring.

### BEHAVIOR IN AUSTRALIA.

This had been tried in the previous century, even before the part played by the barberry was fully understood, by the State of Massachusetts, whose Legislature passed a barberry law compelling landowners to destroy all barberry bushes planted on their land. It was unsuccessful in Massachusetts, but in the light of our present knowledge it is being enforced in some parts of Europe now—Germany and Denmark. Competent observers in both countries in the last few years have reported a marked decrease in the amount of rust. In Australia we have no native barberry bushes, and the shrub is by no means common in gardens; yet, as we have discovered only too well in some years, rust is certainly present. Even when the barberry is introduced to regions where rust is prevalent, the fungus seems to have no effect upon it. Attempts have been made by directly sowing the spores on barberry leaves, by surrounding the barberry by rusted wheat plants, and spreading rusted straw amongst them, yet no one as yet has induced cluster cups to form on the barberry leaves. The teleutospore, then, which in Europe causes infection of the barberry, is in Australia useless. It cannot infect the wheat plant, and for some strange reason does not infect the barberry.

Can any other plant act in place of the barberry? Apparently not. Then, can the fungus survive from one wheat season to the next without an intermediary plant? Apparently it can. We are driven to the conclusion that the wheat rust fungus exists from year to year, and spreads by the uredospores alone, which in Europe possibly serve only to cause rapid spread of the disease amongst the wheat crop of one year. One is naturally inclined to ask what, then, is the reason the fungus forms teleutospores at all in Australia, seeing that it can and does live and grow without them? To such a question no certain answer can be given. It seems to be the habit of the fungus to do so—that is all one can say. The necessity for the teleutospore and cluster-cup stage in the life of the wheat rust has been seriously questioned even in those countries where the barberry plant is found native. It has been suggested that the transference of the fungus to the barberry reinvigorates it. Certainly this cannot be necessary in Australia, where, without barberry, the fungus is often observed in far too vigorous a condition. Experiments have recently been made in America to test whether the barberry is vitally necessary, or whether the uredospores can maintain their virulence when produced on successive crops of wheat only. Uredospores were sown on wheat; the spores produced from that infection were sown on fresh wheat plants, and so on, time after time. After 52 successive infections on wheat had been made, the fungus was found to be as vigorous as ever. There is little evidence, therefore, to show that barberry is necessary, even in those countries where it grows commonly and produces the cluster cups. The question now before us is how the uredospores survive from one wheat season to the next. This has to be solved by each wheat country for itself, because the seasons at which wheat is grown, and the weather conditions in the interval between successive growing seasons are so different. In Europe and the north of the United States of America it resolves itself into seeing if the uredospores can survive the cold of winter. This has several times been asserted for the United States of America, and has recently been abundantly proved, especially for the northern parts, where the uredospores have been kept frozen all the winter, and found to germinate in the spring. Although they can survive continued freezing, it would appear that the alternation of frosts and mild weather causes their death. That is why European observers still dispute the possibility of the uredospore alone being capable of carrying the fungus over the winter.

In the south of the United States of America the conditions are different from the north. The winters are not cold, and vegetation does not cease. The summer months of July, August, and September are very hot and dry. The wheat season is over, and the problem for the fungus is rather how to exist during the dry, hot weather, when no wheat is growing. These conditions are similar to those obtaining in Australia; wheat is growing during most of the winter, after the rains break; the season when there is none growing is during the heat of January, February, and March. We have at present no satisfactory evidence that in Australia the uredospores of one wheat season can live desiccated until the next; rather the reverse. How the fungus survives during our hot summer is one of the many problems that awaits a solution.

### Is Rust Present in the Grain?

If, however, the uredospores do not survive, there is the possibility that the spawn of the fungus may be in the grain. Rust is frequently seen on the ears and chaff of badly infected wheat. May it not spread to the grain, and remain in a resting condition there until it is sown, and grow out when the young plant shoots? Such a state of affairs is well known for several fungus diseases, some of which we will consider in succeeding lectures. The example of the hollyhock rust may be mentioned here as a case in point. Hollyhocks are generally found about Adelaide with little dark-brown patches on the stems and backs of the leaves caused by this fungus. So prevalent is it that I have been gravely assured by a grower that it is the nature of the plant to produce them. These fungus patches may often be found on the familiar disc-like fruits and seeds of the hollyhock, and there is no doubt that the fungus is thus carried to seedlings formed from them. Such patches of rust have been carefully searched for on wheat grains by many observers, but I know of only one account of their occurrence, and that is not very convincing; confirmatory evidence is certainly needed, for except in this one case, microscopic examination has not shown any fungus threads in the grain. Yet often so widespread is the outbreak of rust that some of the most competent observers are convinced that the rust fungus must be present in the seed sown.

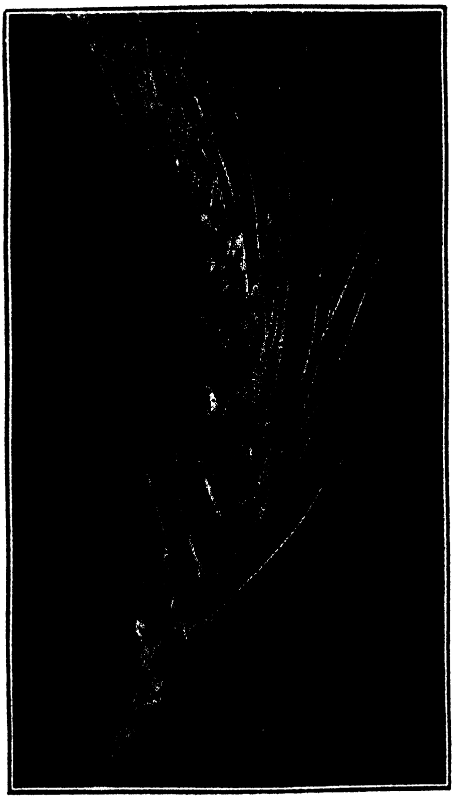

Fig. 4.—Photograph of head of wheat, showing development of rust fungus on the chaff.

### Mycoplasm.

It was this belief that has led the great Swedish botanist Professor Eriksson to advance the remarkable explanation that rust outbreaks are due to what he terms *mycoplasm* in the wheat grain (a compound word suggesting the ideas of fungus and protoplasm). It being agreed by almost every observer that there is no sign of the very characteristic fungus threads of rust in the seed, Eriksson has suggested that within it the living substance of the fungus leaves its cell walls and mixes with the protoplasm of the wheat. There is thus nothing that the observer with his microscope can detect as the fungus; he simply sees protoplasm living within the cells, but cannot recognise that this protoplasm is a mixture of that of the wheat plant and that of the rust fungus. Eriksson admits that no trace of the fungus can be seen in the seed or its embryo, nor in the young leaves that it produces in its first growth. He claims that it is there as invisible mycoplasm. As mycoplasm the rust organism lives in the seed, as mycoplasm it passes out in to the seedling, so into the leaves of the young plant. Here when the warmer conditions of spring come on, the mycoplasm forms special "corpuscules," in which condition it can first be detected by the methods used in staining sections of plant tissue for microscopical examination. From these "corpuscules" the fungus threads reappear, first as the sucker by which the fungus taps the cells of its victim, then as the usual hyphae running in between the cells of the wheat leaf. By this means it will be seen that, according to Eriksson, the first reappearance of rust in the spring is due, not to an infection of the wheat plant from without, but to the fungus which is already within the wheat plant in an invisible condition becoming visible as it forms the hyphae of its normal and aggressive state. The theory is daringly original; if it be true it offers a simple explanation of a very puzzling problem. On the face of it it seems impossible; but, of course, that is the last reason that should be given for rejecting it. In vegetable organisms the living protoplasm of the plant is protected by a cell wall. With the exception

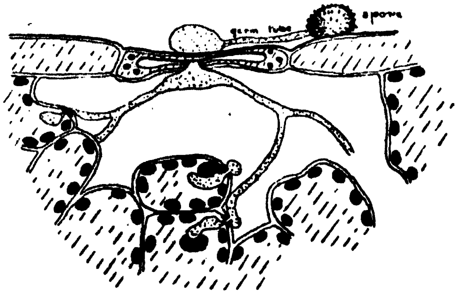

Fig. 5.—Diagram to show infection of wheat leaf by uredospore. The spore is seen on the surface of the leaf to the right. The germ tube grows along the surface and enters by a pore into an air space in the leaf. The development of suckers from the hyphæ passing into the leaf cells is shown.

of a relatively few organisms on the borderline between plants and animals, this holds good for all plants throughout their whole life, except at a brief period in which egg and sperm unite. We need, therefore, the strongest possible reasons for abandoning this view, and for believing that a fungus with such an elaborate life story, and with so many different spore forms as *Puccinia,* will at times abandon its very structure, and exist simply as naked protoplasm in the cell of another plant. We owe to the late Professor Marshall Ward, of Cambridge, a most prolonged and critical examination of Eriksson's hypothesis. He first of all studied in detail the full story of infection of wheat leaves by the spore. The germ tube was watched; it was seen extended along the surface of a wheat leaf till it came to a breathing spore. Then the swelling of the hypha was watched, its entry through the pore, and the subsequent growth of the hyphal branches along the inside of the leaf between its cells. These internal hyphae were watched putting out their suckers into the cells, so getting into the closest contact with the living substance of the wheat plant they contained. In this manner the formation of a disease spot or lesion, to use the medical term, was watched in every phase of its development. The examination of many hundreds, even thousands, of sections convinced him that all the hyphae in any lesion radiated from an original centre of infection by a spore. He says, "I have never been able to detect the slightest sign of the fungus in any area not infected from outside." Ward readily agreed with Eriksson that no trace of the fungus could be found in the seed, embryo, or young plant on germination. The difference in their opinions was that Ward held that the rust was not there, Eriksson that it was there, though in a form not discoverable by any microscopic methods known.

Ward further searched most carefully for the special "corpuscules" in which form Erikson, it will be remembered, declared that his mycoplasm first materialised within the leaf. Ward frequently saw such bodies in the wheat cells, but they were, in all cases, nothing but the suckers that the rust hyphae outside had inserted into them. Sometimes Ward's sections would show these apparently isolated and not connected with any hyphæ. These Eriksson would say were "corpuscules" of mycoplasm not yet grown out. Critical examination always showed, however, that such an appearance was due to the way the section of the leaf was cut. The connection of the "corpuscule" with a hypha could always be found if the preparation was favorable. In short, one is forced to the conclusion that the mycoplasm theory rests on a most curious inversion of the order of a series of observations. Instead of the "corpuscules" materialising out of invisible mycoplasm, then putting out a process from the wheat cell into the spaces of the leaf, and so forming a hypha, the "corpuscles" are nothing but the suckers of the rust fungus already in the leaf, inserted into the leaf cells from outside, in order that the rust may gain its nutrition. It is difficult to see how a worker to whom we owe so many real advances in our knowledge of rusts can so curiously have inverted the true order of things. If mycoplasm does exist, it must be shown to materialise in some other form than the "corpuscules" that Eriksson has described. The utmost we can say, in concluding our examination of the much-discussed mycoplasm hypothesis, is to return a verdict in the Scots' way of "not proven."

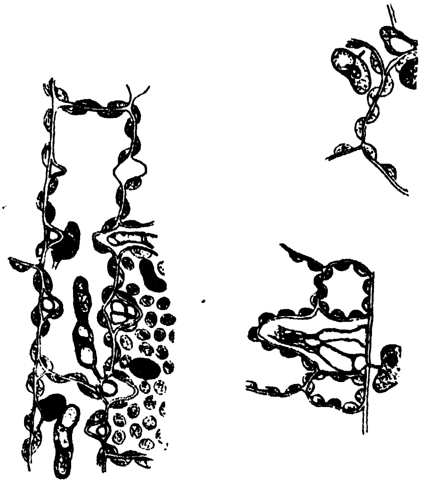

FIG. 6.—Suckers from hyphæ of rust fungus in cells of wheat leaf. Such suckers Ward suggests Eriksson has regarded as corpuscules of mycoplasm. (*From Ward.*)

## IS WHEAT ATTACKED BY RUST FROM OTHER PLANTS?

How, then, are we to account for rust outbreaks? I have purposely left one of the most obvious explanations that can be advanced to the last, for it opens up such a great field of new ideas. If there be no wheat growing between harvest and the opening of the next season, why cannot the rust exist as a parasite on some other cereal or grass? At first sight, this suggestion seems so obvious that possibly some of you may wonder why I have dealt with these other possibilities that seem more far-fetched and less probable. This point brings us, however, to the great contribution that Eriksson especially has made to science. It is quite true that black rust occurs not only on wheat, but on oats, barley, and rye, as also on a large number of genera and species of grasses. Mr. McAlpine has recorded it on above 20 different species of grass in Australia. On all these plants the fungus exists, producing uredospores and teleutospores that are, to look at, quite indistinguishable—the disease is apparently identical in all cases. Eriksson, however, finds this remarkable thing. The uredospores formed by wheat plants will not infect any of the other cereals with rust, except, perhaps, barley feebly. Those formed on rye attack barley, but not wheat or oats. Those on oats attack some other grasses, but no other cereal. There is here seen a remarkable specialisation in parasitism. The fungi concerned are clearly very different in their habits, although quite indistinguishable to look at. No doubt, the living substance forming a wheat plant differs in some ways from that forming an oat plant. We are not able to see that difference, nor can we detect it by analysis. Evidently the rust fungus can. It has accustomed itself to feeding upon the substance of one kind of plant, and for some reason cannot feed upon other kinds. Why this should be so we cannot attempt to explain; we simply have to accept the fact that it is so, indisputably proved by an ever-growing number of experimenters. In the face of this, then, we recognise that the possibility of direct infection of wheat from some other cereal crops is quite impossible, and even from some wild grass is remote in the extreme. During its evolution the fungus *Puccinia graminis* has evidently become split up into a number of sharply defined strains or varieties, each living on its own host or hosts. These varieties are sometimes called biological species, since, although they are indistinguishable by the ordinary methods of examination, they are very definitely different in their requirements in the way of food. But though the discovery of this extreme specialisation has done much to help us to get more accurate ideas on the danger of rust outbreaks spreading from crop to crop, it has brought us no nearer to answering the question of how can we account for the annually recurring outbreaks of rust disease. It must be frankly admitted that the question is a "real poser."

### WIND AS A CARRIER OF INFECTION.

Once the first wheat plant is infected the rest of the story is clear. The number of uredospores formed on only a single disease spot is very large. Under suitable conditions each uredospore freed can soon form a fresh spot, producing spores again in about a week. The crux of the question is—Where do the first spores of the season in any district come from? We have seen that they probably cannot remain desiccated for the whole dry season—that explanations by the occurrence of the fungus in the seed are not substantiated, that mycoplasm, to say the least, is improbable, and that the rusts are so specialised in their parasitism that those occurring on different grains are but rarely interchangeable. There may be some Australian grasses with a variety of rust growing on them which will affect wheat, but we do not know of any, and in other countries the danger of infection from this source is not considered great. We have to remember this, though, that the carrying power of the air is very great. Wheat is universally grown, rust is never completely absent, and uredospores are very numerous—hundreds being formed by any single small disease spot. The spores are very light—far lighter than dust particles of the same size, and we have some astonishing records of the travels of a dust particle. In August, 1883, as a result of a terrific volcanic explosion, most of the small island of Krakatoa, in the Java Sea, was blown to fragments. Half the island disappeared, and thousands of people perished. What interests us more immediately at present is that the ejected volcanic ash, carried by the wind, fell as rain at places 750 miles away, while the finest particles drifted in air currents around the whole world, causing most wonderful sunsets. In March, 1901, dust clouds arising in Northern Africa were, during the next two days, the cause of dust showers that fell in the Alps, in Hamburg, and the Danish Isles, as the particles drifted northwards. Surely rust spores, that are so much lighter, may reasonably be assumed to be carried over distances at least as great as particles of sand and grit from the Sahara Desert? It has been proved that large numbers of rust spores are present in the air at various times. Cotton plates placed in the open have been found to collect thousands of uredospores in the course of a wheat season. More interesting still are some experiments carried out in the last few years in the United States of America. Dishes containing water were exposed for four hours on various days in the spring months at the top of a building in the University at Minneapolis. On examining the dust collected in this water, several uredospores of *P. graminis* and other rusts were found. Such experiments have been repeated on several occasions in the early spring, and the uredospores obtained. Now, Minneapolis is in the north of the United States of America, and at that season there is no rust to be found in the wheat fields of the district. The uredospores must have been blown for some distance—it is suggested from the wheat fields of Texas, in the south, in which rust is usually plentiful at that date. The uredospores may not be able to survive the long drought of the summer, but they can live for days, or even a few weeks, in a dry condition. This is ample time for them to be carried in air currents for thousands of miles. In Australasia we have a very great range of climates, so that in view of what is known for the United States of America, the suggestion that spores formed in one State may cause infection in another is not so unreasonable as it might at first sight appear to be.

## EPIDEMICS.

Though in every season there is present in the crop a small amount of rust, it is fortunately only seldom that the disease is at all abundant. When this is so, we may say that there is an epidemic. It is generally believed that these seasons in which epidemics occur are marked by special climatological conditions. A period of warm, muggy weather, following an unusually abundant rain, is usually regarded as favorable to a serious outbreak. Why this should be so is not generally understood, and seasons are known when the weather has been such as to make an epidemic likely, yet, fortunately, it has not come off. There evidently are a number of conditions to be fulfilled before the disease can become of sufficient importance to be regarded as an epidemic. It will be seen that as rust is a fungus attacking a living plant, two distinct organisms have to be considered. We may state that at least three conditions must be fulfilled. There must obviously be present a sufficient number of spores to give the fungus a start. The weather conditions, especially those of moisture, must be suitable, for the uredospores need water upon the leaves in which to germinate. Finally, the crop itself must be in a suitable state to catch the disease. What is meant by this last condition it is difficult to state shortly, but while wheat may, of course, develop *P. graminis* at any time, it is particularly liable to do so when the ears first appear. Just as we ourselves may at times be more liable to catch colds, influenza, or more serious diseases, so plants, too, have undoubtedly periods in their life when they are susceptible to attacks by a parasite, and others when the parasite can do little or no damage. (In our next lecture, when considering disease in general, we shall return to this point). *P. graminis,* too, is only one of several rust fungi known to attack wheat; we have one other rust in Australia. Each of these seems to have its special season, a period in the life of the wheat plant when it can attack and do most damage. At other times the same disease may be almost harmless. Again, parallels in diseases of human beings will occur to your mind, as the diseases attacking in childhood and not in adult life.

## IMMUNITY.

One of the most striking features of a rust attack on wheat plants is the fact that while some wheats will have the disease badly, others will only suffer to a slight extent or not at all. We say that those plants which are not attacked are immune to rust, or, at least, rust-resistant. The mere giving of a name to a natural occurrence settles nothing. The intelligent mind at once asks why. It has often been asserted that immunity is a result of some difference in structure between the two varieties. That great Australian benefactor, W. Farrer, inclined to this view, and many others with him. In this connection the work of Marshall Ward on a rust attacking various grasses, known as *Bromus*, is of great interest. Bromes are among some of the commoner grasses occurring naturalised about Adelaide; some few are of great fodder value, such as the prairie grass, *B. unioloides*. Now the genus *Bromus* is a very large one, and the various species show a considerable range of

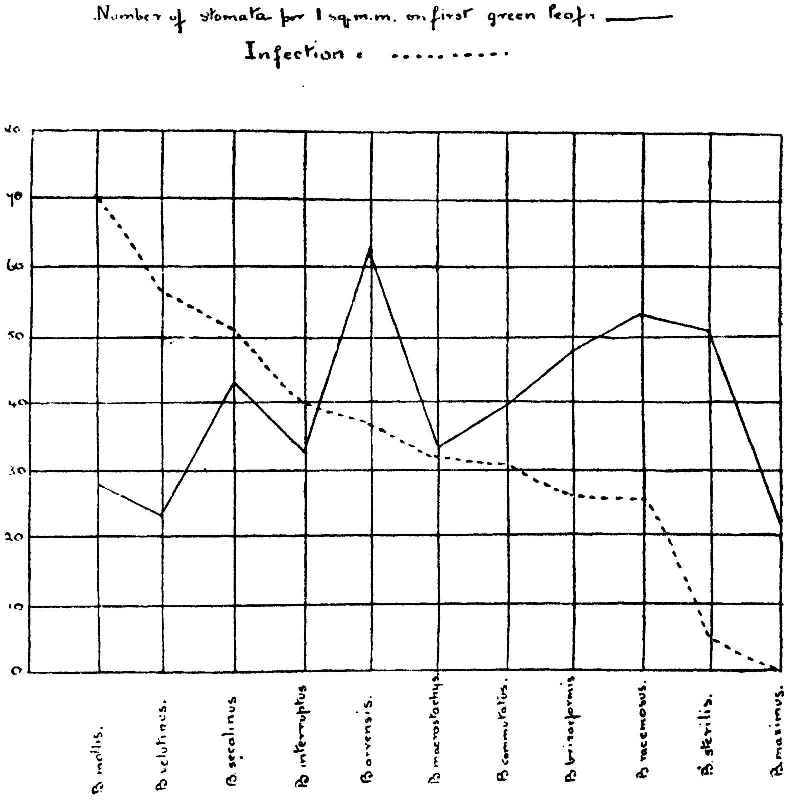

FIG. 7.—Curves showing relative susceptibility to infection by rust and number of pores (stomata) per square m.m. on leaves of certain bromes. The species are arranged in order of susceptibility, with the most resistant on the right. It will be seen that the curve (solid line) showing the number of pores has no relation to that (dotted line) showing the resistance to the disease. (*Modified from Ward.*)

form, habit of growth, difference in hairiness. They also show a great variability in the way they suffer from the rust attacking them. Ward tested then some 20 different species, comparing their structure with their relative immunity to the disease. The work was most detailed; let us consider but two points. The uredospores infect a plant by growing through its breathing pores or stomates. It might reasonably be suggested that if the leaves of a species have many more breathing pores than the leaves of another, so many more points of entry for the fungus will be provided. Consequently, the former leaf will be more badly rusted than the latter. So it might seem; but in point of fact it is not so, as the accompanying curve shows. The immunity has no relation whatever to the number of stomata on any given area.

Similarly, it might be suggested that a hairy leaf would retain more spores than a smooth one, and hence be more seriously attacked.

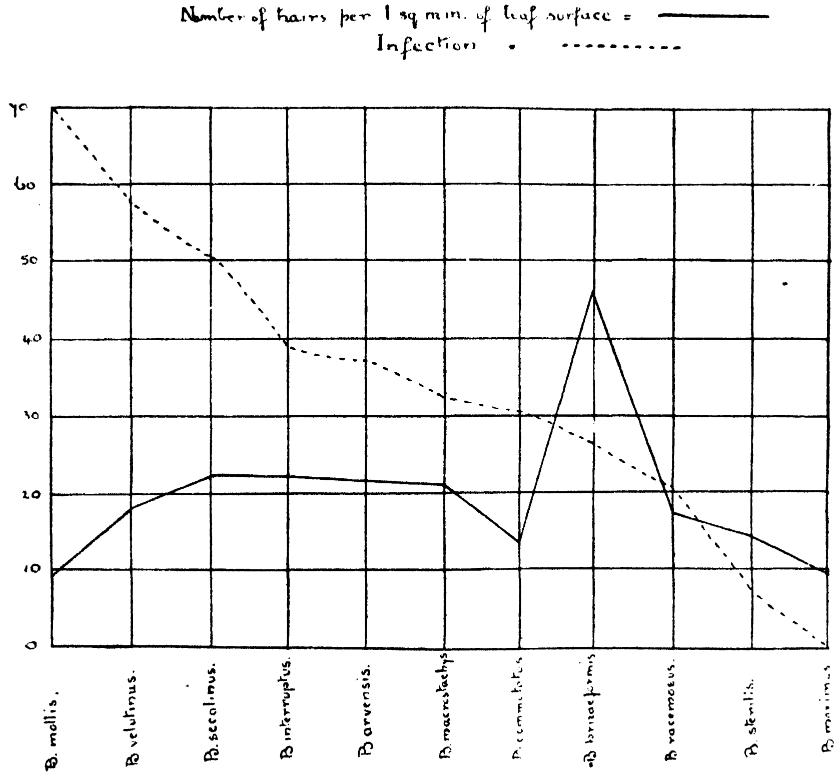

FIG. 8.—Curves showing relative susceptibility to infection by rust and number of hairs per square m.m. of leaf surface in certain bromes. As in the case of the number of stomata (fig. 7), the number of hairs has no relation to the degree of resistance to rust shown by a species. (*Modified from Ward.*)

Again, the curve shows that the relative immunity to rust is quite independent of the number of hairs. The only possible conclusion that can be reached may be stated in Ward's words—"That the capacity for infection or for resistance to infection is independent of the anatomical structure of the leaf, and must depend on some internal factor or factors in the plant." Immunity to disease in the brome grasses, and we may well believe that it holds for other plants, too, depends upon a physiological character of the plant attacked. It rests upon that indefinable thing that we call the constitution of the organism.

In this connection it is most interesting to note that uredospores falling into a drop of water upon the leaf of an immune wheat will germinate just as they will in any drop of water. Moreover, they grow towards a breathing pore on that immune leaf, and may even enter it, by passing between the two cells guarding the hole. Yet the fungus produces no disease. These attempted infections of immune wheat by rust have been carefully studied by several investigators. In some cases the fungus grows through the pore and develops no further. It seems as if the wheat plant had some substance in its sap that the fungus could not absorb, consequently it starves and dies. The behavior in other cases is even more striking. The hypha passes through the pore and begins to grow amongst the cells of the leaf. These cells rapidly die on all sides, possibly because the fungus forms a substance that is a violent poison to the particular variety of wheat. Therefore the fungus hypha is left surrounded by the dead cells of its host, and consequently dies itself of starvation, because it can only feed upon living material of the host. So that in such cases the disease does no more harm than form very small spots of dead cells at each centre of infection. In other words, such a variety of wheat is so susceptible to poison by the fungus that it is immune to rust. It is in cases where the wheat is much less susceptible, where the fungus does not rapidly kill, but merely robs the cells of their food, that rust does serious damage. By this prolonged attack of the fungus the whole vitality of the plant is lowered, so that it has much less food to store in its grain, if, indeed, it can form viable seeds at all.

## Rust Resistant and Rust Escaping Wheats.

Every effort has been made to raise and cultivate varieties of wheat which are resistant to rust. In this direction Australians owe much to William Farrer, of New South Wales, whose experiments, carried out over a long series of years, did much not only to improve the type of wheat grown from an agricultural point of view, but to breed rust-resistant varieties. However, it must be remembered that there is such a thing as a variety of wheat that can generally be grown without suffering from rust attack, but which is not really immune. We have seen that at least three conditions must be fulfilled, in order that a disease shall become epidemic—there must be the fungus spores in quantity, the right weather conditions, and the plant attacked be in the right stage to catch the disease. Now, many varieties of wheat that are rust proof are so because they mature early in the season, so that the critical stage, when they are most liable to suffer from rust, which is when the ears are first emerging, is passed before the other conditions of weather and spore numbers are fulfilled. They are not really disease resistant, but disease escaping. This point may not seem to you to be of great importance to the grower, who is concerned in raising a clean, healthy crop, and who probably, very naturally, cares but little about such an intangible thing as the constitution of his plants. It is, however, a matter of great importance, for the reason that a variety may be perfectly rust free in one place, and the same variety badly attacked in another. The variety is not really immune at all; it merely is disease escaping. When planted elsewhere it becomes attacked because the alteration of conditions may so affect its growth that it will reach the critical period for infection at the same time that the other conditions of weather and presence of spores are fulfilled. Thus it is that the varieties suited to one country behave quite differently in others.

That this is not merely a matter of soil difference is shown very clearly by some interesting work conducted in the United States of America during 1909-1912. The wheats grown in California, Kansas, and Maryland differ considerably in the chemical and physical properties of their grains. Is this difference due to soil or climate? Experiments show it to be due to climate. "Fairly good wheat soils, one each from California, Kansas, and Maryland, were put down side by side in each of these three localities and cropped with the same variety of wheat.' The result was that the crop raised in Maryland, was uniform, whether it was grown on Maryland soil or that from the other two States. Similar results were obtained in California and in Kansas—surely an excellent demonstration that it is not the soil, but the climatic conditions, that influence the type of wheat produced. Attempts have often been made to show that a plant varies in its degree of resistance to disease when it is starved or well manured. Except in cases of excessive nitrogen supply, they have completely failed. We can confidently say, then, that the immunity problem is capable of no such simple solution as the mere nutrition of the crops. It is with plant diseases as with animal diseases, the further you investigate them the more complex the problems become, owing to the interference of quite unforeseen and as yet very intangible factors.

In the past 50 years the advances that have been made towards a solution of the rust problem are tremendous. Rust is no longer a mysterious visitation greatly to be feared. It is a well recognised fungus disease, and the damage that it causes has in most years been reduced to a minimum. Two classes of investigators have by their discoveries brought about this change—they are the botanist in his laboratory and the plant breeder in his field plot. But great though the advance has been, there is yet more to be accomplished. There is still the danger of the exceptional year, when by a combination of unusual circumstances even the most resistant wheat may succumb to attack. To the same two sets of investigators we must look for still further advances, remembering that, as Milton has said:—"The light which we have gained was given not to be for ever staring on, but by it to discover onward things, more remote from our knowledge."

## BLACK APHIS OF THE PEACH.

"The best remedy for the black aphis of the peach," said Mr. Quinn (Horticultural Instructor) in reply to a correspondent, "I believe to be strong tobacco and soap wash, into each gallon of which one pint of resin compound is mixed. The tobacco wash is made by simmering for a couple of hours in hot water, or steeping for a couple of days in cold water, tobacco waste at the rate of from 2ozs. to 4ozs. per each gallon of water, then into the strained liquor dissolve common soap 1oz. per gallon. The resin compound is made by boiling resin, washing soda, and soap, at the rate of 1lb. powdered resin, 1lb. washing soda, ½lb. soap in each 5galls. of water, until all are dissolved into a strong brown liquid. The resin wash can be kept almost indefinitely, and used as required. It may be made more concentrated for keeping, and diluted as needed for spraying. If these washes can be applied fairly warm, their killing powers are increased."

# BREAKDOWN, OR COLLAPSE, IN MILCH COWS.

[By T. H. Williams, Chief Inspector of Stock.]

Owners of milch cows in many localities in the State sustain serious loss every year through their cows suddenly going off their milk, and becoming sick. Practically no symptoms of the approaching collapse have been noticed beyond the fact that the cows have been ravenous after bones, old leather, and various other articles quite foreign in the way of natural food. They are known as "bone-eaters." Sooner or later these are the cows which "break down," or collapse, as the American authorities term it. Some years ago the veterinary officers attached to the American Bureau of Animal Industry carried out a series of investigations extending over some years, with a view of discovering the cause of the trouble in milch cows, which were practically the only animals affected. As the final result of the investigations, they now say that want of a constant and sufficient supply of salt is the main factor. Every cow in milk needs not less than 3oz. of salt daily. Pregnant cows not at the pail need not less than 2oz. daily. During the investigations, large numbers of cows were dealt with. In some cases, where large herds of milch cows were running on the same pasture, half were allowed 3oz. of salt daily, while it was withheld from their companions. The results were surprising, as in some cases all the cows which did not receive salt "broke down," while the others remained healthy.

## A Good Stock Lick.

The investigations made by the Americans do not stand alone, as the authorities in this State have been urging cow owners to supply salt to their cows, and where this has been done systematically the results have been equally satisfactory. Owners must realise that a spasmodic supply of salt does not fill the bill. Probably the best method of administering this condiment where cows are hand-fed, is to put it in their feed daily.

The formula for mixing a good stock lick is as follows:—100lbs. salt, 100lbs. fine bonemeal, 1lb. sulphate of iron; thoroughly mix and place about in strong troughs or boxes. To induce the stock to take to the lick, sprinkle a little chaff and bran on it. Owners must realise that the lick is simply a condiment to aid digestion and counteract the craving for bones. It does not follow that because the lick is supplied animals can do on a reduced diet deficient in nourishing properties. The average milch cow requires anything from 24lbs. to 28lbs. of sound nutritious food and from 8lbs. to 10lbs. of roughs daily, otherwise she will lose condition, and the milk will decrease in quantity and become poor in quality. This brings us to the question of dry *versus* wet feeding of cows. It is a common practice to put water with chaff and bran, and in this form it is readily eaten, but many animals so fed soon develop derangement of the digestive functions, and the explanation is that wet sloppy food is bolted without being properly masticated, and is not returned to the mouth again for cudding. It has been observed at *post-mortems* on sloppy fed cows, which have succumbed through weakness owing to impaired digestion, that the stomachs and bowels are flaccid and pale, and lack vigor. On the other hand, cows fed on dry chaff and bran must chew it thoroughly before they can swallow it, thus mixing the saliva of the mouth with it. In this way it is made ready for rumination, and natural digestion later on. There is no doubt that food taken in this form is more readily digested and assimilated than it is when wet and sloppy. Cows always do better when given a few pounds of long hay or sound straw, following chaff and bran.

## Cows on Mallee Country.

The question will probably arise as to whether the pastures between say, Cooke's Plains, Keith, and Wirrega, etc., are suitable in all respects for cows, and the answer must be "No! not at present," as the bulk of the soils are of a light sandy or limestone character, from which mallee and other timber has recently been cleared. Cattle, particularly milch cows, will need to be hand-fed for quite 10 months of the year. With manures and cultivation we may reasonably hope that the time is not far distant when good natural pastures will become thoroughly established, as has been the case in other parts of the State where whipstick mallee alone grew. All stock will no doubt do better if part of their chaff supply can, for a year or so, be drawn from that grown on the stronger soils of the State.

## The Water.

The effect of impure water on cattle is so vital that the matter cannot too seriously engage the attention of owners. No matter how good their feed may be, cattle will die of toxæmic paralysis if their water supply is deficient and impure. A cow of from 6cwts. to 7cwts. needs from 5½galls. to 10galls. of pure water daily. The disastrous effects of impure water on cows on many farms in this State have frequently been observed, and the mortality attributed to all sorts of causes but the right one. On no account should stock have access to dams, or other stagnant water supplies. The water must be raised and supplied from troughs. Most of the mortality of stock in the South-East is due to the fact that during summer they are forced to drink at the small filthy dugout waterholes and swamps, where the fluid is teeming with parasitic life, chiefly the various kinds of worms which cause disease and death. From an economic point of view, the supplying of pure water to stock means many thousands a year in the pockets of owners. The motto should be, "I need pure water. So do the creatures which are under my management and care."

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# ADVISORY BOARD OF AGRICULTURE.

The usual monthly meeting of the Advisory Board was held on July 12th, there being present Messrs. F. Coleman (chair), A. M. Dawkins, J. Miller, W. J. Colebatch, T. H. Williams, G. Jeffrey, Professor Perkins, Col. Rowell, and the Acting Secretary (Mr. H. J. Finnis).

## POISONING DESTRUCTIVE BIRDS.

The question of destroying pestiferous birds was again brought under notice, and opinions of ornithologists, as expressed before a Conference of interested parties, held in 1909, read and considered. Action was deferred until the next meeting.

## INSTRUCTION FOR MURRAY SETTLERS.

The provision of suitable instruction and guidance for irrigationists on the newly-opened River Murray settlements was discussed at length, and ultimately a sub-committee consisting of the Chairman and Messrs. Laffer, Dawkins, and Jeffrey, was deputed to wait on the Minister of Agriculture in regard to the matter.

## LIFE MEMBERSHIP.

The name of Mr. A. L. McEwin, of the Blyth Branch, was added to the list of life members of the Agricultural Bureau.

## BRANCH BUSINESS.

The formation of a new Branch of the Bureau at Cummins was approved, and a request from Tintinara that the Branch should go into recess until the termination of the war, was assented to. Seventy-three names were added to the rolls of existing Branches.

# EXPERIMENTAL FARM HARVEST REPORTS.

By W. J. Spafford, Superintendent Experimental Work.

## 5.—EYRE'S PENINSULA EXPERIMENTAL FARM.

Manager: Mr. L. J. Cook.

This farm consists of 3,041 acres, comprised of the sections 26, 27, and 28, in the hundred of Minnipa, situated 158 miles north of Port Lincoln. It is fairly centrally situated as concerns the whole of Eyre's Peninsula, and will be the point from which departmental activities in agricultural matters on that vast stretch of arable land will proceed. It should serve to advertise the possibilities of this practically unknown country, and should hasten the day when up-to-date farming methods are the recognised practice of that part of the State. The whole of the farm is gently undulating, and practically the lot of it can be put under cultivation. The above-mentioned sections were dedicated as a reserve for agricultural experimental purposes in November, 1914. A manager was appointed from January 1st, 1915, and operations were commenced in that month.

### The Season 1915.

This being the first year of the farm there are no previous rainfall figures with which to compare this year's fall. There was very little rain in the first three months of the year—a total of 85 points only. A fall of a little over an inch was registered in April and 2in. in May—being nice rains for seeding operations. The falls of June, July, and August were good; but September eased off considerably by only producing 1in. of rain, and October only gave less than half an inch. In November nothing fell, and in December only 44 points were registered. The table following shows the monthly falls at the farm:—

*Rainfall Distribution, Eyre's Peninsula, 1915.*

| | Inches. |
|---|---|
| January | 0·74 |
| February | 0·09 |
| March | 0·02 |
| April | 1·18 |
| May | 2·03 |
| June | 1·88 |
| July | 2·54 |
| August | 3·57 |
| September | 0·98 |
| October | 0·41 |
| November | — |
| December | 0·44 |
| Total | 13·88 |

### Distribution of "Useful" Rainfall.

The rainfall, though low, was distributed very well, as the following table showing the distribution of "Useful" rainfall indicates:—

*Distribution of "Useful" Rainfall, Eyre's Peninsula, 1915.*

| | Inches. |
|---|---|
| Seeding rains (April-May) | 3·21 |
| Winter rains (June-July) | 4·42 |
| Spring rains (August-October) | 4·96 |
| Early summer rains (November) | — |
| Total "Useful" rain | 12·59 |

These figures show good seeding rains, fair winter rains, and very fair spring rains. It would have been an improvement to have received some early summer rains; but there was a sufficiency of spring rains to bring the crops properly to the hay stage.

### CROPS.

Starting a farm covered with scrub in January does not give much time to prepare land for cropping; but as there was a possibility of the land comprising the surrounding hundreds being allotted to settlers this year, we recognised what a great advantage it would be to these settlers to be able to obtain fodder for their stock close to their farms, so it was decided to at least put in some cereals for hay. The greater part of the farm is heavily timbered; but surrounding the Yarwondutta Rocks, which are situated on the property, was a strip of country with only a few trees, but covered with bushes 6ft. to 8ft. high, consisting principally of acacias, cassias, alyxias, geijeras, hakeas, santalums, &c. This block was thoroughly cleared by pulling the few trees with a machine and removing the bushes, roots and all, with horses on a heavy chain. The land was ploughed as soon as cleared, and harrowed before being drilled.

The seeding consisted of the following cereals: —

*Cereal Crops for Hay, Eyre's Peninsula,* 1915.

| Variety | Area. | Seed per Acre. | Super. per Acre. | Date Sown. |
|---|---|---|---|---|
| | Acres. | lbs. | lbs. | |
| Algerian oats | 48 | 78 | 113 | May 5–8 |
| Silver King | 37 | 75 | 90 | May 19–22 |
| King's Red | 35 | 92 | 96 | June 15–17 |
| Gluyas | 14 | 83 | 120 | June 18–19 |
| Eclipse | 14 | 82 | 120 | June 19–21 |
| Total area | 148 | | | |

The whole crop was harrowed immediately after seeding. The oats were sown "dry," and the surface of some patches in the crop caked after the first rain. This necessitated another harrowing of these small patches. Part of the King's Red germinated badly, so it was resown with 45lbs. Eclipse wheat to the acre.

### YIELD OF HAY.

The whole of the crop was cut for hay and produced—on stack measurement—280 tons of hay, or a yield of 1 ton 17cwts. 94lbs. to the acre.

This is a very fair yield, but would have been considerably higher could the seeding have been completed early enough. This was shown by the crops that were sown in May—the oats did remarkably well, the Silver King was a good deal above the average, and a narrow strip of King's Red that was put in at the same time produced a really first class crop of hay. The later sown wheat did not have time to produce much growth, still the quality was first class and the growth was very fair.

# SHEEP ON SMALL AREAS.

Mr. Henshaw Jackson (Wool Instructor to the School of Mines) addressed the Conference of the River Murray Branches of the Agricultural Bureau on this subject.

Whilst as far back as B.C. 106, Cicero had stated in his book of the farm that "the feeding of cattle is the most important part of agriculture," there was still every need, said Mr. Jackson, to constantly advocate the feeding of sheep.

It was interesting to note that a New Zealand farmer was reported to have turned off 1,535 lambs from an area of 36 acres, and whilst the statement was a startling one, it indicated the possibilities of the industry under a system of hand feeding. Experience had proved that in Australia they could do better with sheep and wool than had ever been accomplished in any other part of the world. However, in so far as feeding was concerned, Australian sheep men seemed content to leave that aspect of farming to the dairymen, and omitted to apply his methods to increase the mutton and wool production as did the dairyman his milk and butter.

A recorded production of 60 tons of green fodder per acre by a dairy farmer in Victoria, and the possibilities of others securing similar high returns by systematic and careful cultivation, manuring and rotation of crops, suggested big things in the way of feeding sheep.

He advised sheepowners to try the effect of feeding their stock on sorghum, cowpeas, and green corn. By way of trial they could put 10 acres under forage crops, and draft off even as few as 50 sheep to feed and fatten thereon.

Up till the present they had been sheepbreeders in the pastoral sense, and successful ones, too. In the future they should be sheepfarmers, and there was a vast difference between the two businesses. Sheepbreeders need have no fear, however, and should do all in their power to encourage sheepfarming, because the greater the number of sheepfarmers the more need there would be for those who possessed the gift of breeding sheep, and who would be called upon to supply the wants of farmers in replenishing their flocks from year to year. Failures there had been, and they might occur again, on the part of those who had gone in for breeding sheep of the British breeds; but such failures had largely been the result of crazes for some particular variety without any real trials having been made in connection with it. Perhaps those who took up that work had been perfunctory in their methods, or thought it enough to buy the sheep and let Nature do the rest. He had seen cases of that kind, and knew of at least one flock of a British variety that had been dispersed by auction and scattered throughout the State, and on the very same property came another man who bought some of the original flock, added others of the same breed, and was to-day doing well where the previous owner failed. It was mainly a question of knowing how. If they kept sheepfarming distinct from sheepbreeding, men would gradually find their own level at both games, and in time each would flourish.

### FEEDING.

Of the three departments of sheep husbandry, the most inportant was feeding. The blood of a thousand years, the longest and most celebrated pedigree was, after all, nothing but the outcome of good feeding. Under the term "feeding" should be included care, management, choice of sheep suitable to surrounding conditions, &c. The skilful breeder could select an animal with consummate insight into its good points, but he could not change its former fleece one iota, except by combination with another sheep (breeding), and especially by care and management (feeding). Nature made all the changes herself, man only supplied the conditions. Good feeding simply gave Nature or heredity a chance to do the best. The life of sheep on out-back pastoral areas developed muscle, but weakened the fibre of the fleece, and heredity possibly tended to perpetuate these characteristics; but with good pasture available, and full hayricks, and faithful daily care, a good carcass and a healthy, robust fleece could be produced. A sheep, just as much as any other member of the farm livestock association, was entitled to a square meal, not only now and then, but all the time. Apart from the question of a fair deal to the sheep in the direction of fodder it became compulsory to see that they had sufficient, if there was to be any profit in having them on the farm. So far as quantity went, when it became a matter of necessity to feed sheep for maintenance a pound of chaff plus a fourth of oats would not only support the animals in comfort, but would even put them a little forward in condition, and ready to take advantage of the rich, natural herbage and grass when it came along. With regard to quality of food, nutrition values and nutritive ratios, seeing that they were only at the A B C of sheep feeding in Australia, before they tackled decimal fractions and quadratic equations, they had better take the simple addition factors of the sum, and learn to begin with the axiom that one sheep and 1lb. of wheaten or oaten chaff would do very well, and with the addition of another pound of chaff and ¼lb. to ½lb. of oats or barley it would become an important help in moving off any mortgage or liens that might be around the place. A sheep, plus 2lbs. cocky chaff, dampened with molasses, at the rate of a quart to 4galls. of water, would also appear as an animal not to be ashamed of, while a sheep plus 2lbs. to 2½lbs. lucerne hay, or 6lbs. to 8lbs. green lucerne, had better be sent to market to break mutton records. The rations mentioned—all easily procurable on the farm—would keep sheep going strong as regular revenue producers. The rules, after all, were fairly simple, and they could easily remember that a sheep, like the cow, needed bulk in its ration, and that could be supplied in the shape of chaff and hay, while any increase in the flesh-forming constituents of fodder could be added by including an extra amount of grain. A comparison of the price of hay and grain, when sold as such, and the price of it when walked off the farm by sheep, would show something of the future before the business of sheep farming when undertaken as a business. The art of feeding took account of all that the sheep required to promote its health and growth. Not only feed, but the water had to be considered.

### Mineral Requirements of the Sheep.

The sheep needed a large proportion of mineral matter, either in its feed or in the water. Five per cent. of clean wool was sulphur, 2 per cent. of the sheep's urine was mineral, 13½ per cent. of the dung was mineral, the bones contained 60 to 70 per cent. of phosphate and carbonate of lime; the yolk had a large proportion of potash; and the flesh and blood contain phosphorous, sodium, potassium, chlorine, magnesia, iron, and lime. The bones of the sheep contained 11 per cent. more carbonate of lime than those of cattle, 5 per cent. more phosphate of lime, and a fraction more of magnesia, lime, and potash. That showed the necessity for supplying the sheep with mineral substances, and explained why hard water was much better for a flock than soft water. So far as sheep were concerned, the bulk of their mineral requirements could be found in the home-grown crops, and with the addition of rock or coarse salt readily available, they would be found to do well enough. At the same time one wishing to see the effect of a specially compounded lick might mix salt 40 parts, lime 5 parts, sulphur 5 parts, and place it where the animals could get it. A more elaborate mixture, that the average man might not care to trouble about, was the following:—In parts, salt 30, phosphate of soda 9, fluoride of calcium 1, sulphate of iron 1, bone ash 30, chalk 14, sulphate of magnesia 10, wood charcoal 2, sulphur 3.

### The Possibility of Surplus Hay in Terms of Sheep.

If they took that year's hay crop of all kinds as 1,100,127 tons, and allowed half of it for use in feeding other stock used on the farm, principally horses, and the remainder as sheep feed, it would support more than 3½ million ewes in good enough condition to grow a fleece of wool and bring a lamb. That, too, if it were necessary to feed every day in the year, which was not likely. When it came to fattening for market, harvest reports showed that there was a sufficiency of all kinds of grain, leaving wheat out of the question, to satisfactorily send the surplus stock away as fats. That was of the utmost importance, in view of the future of the meat market. Australia was in no position at the present time to cope with anything like the demand that would set in for meat once the war was over. They could remedy that in time if they seriously undertook the proper care and feeding of livestock. But they would have to begin at once. There was every reason that Australia should become the meat emporium of the Empire, if not of the world. The start in that direction should be made by improving the methods of feeding stock.

# CO-OPERATION.

At the recent Conference of River Murray Branches of the Agricultural Burea the Director of Irrigation (Mr. S. McIntosh) contributed a paper. The present, he said, was a most fitting opportunity to give consideration to the benefits which were to be derived from the inauguration of a complete co-operative system of preparing and marketing the produce of settlers along the Murray, more particularly those on the irrigation and reclaimed areas, in addition to the purchase of stores, implements, &c. After dealing shortly with various local co-operative efforts, he stated that, when it was considered that for the bulk of the lines of produce grown along the Murray Valley, the producer did not get more than from 50 per cent. to 60 per cent. of the amounts charged the consumer, it was apparent that the middlemen were securing a handsome profit. At an early date in the history of the industry the dried fruit growers at Renmark and Mildura had formed a co-operative system, and settlers should now combine to market their milk, cream, butter, cheese, bacon, &c., and provide for the purchase of stores and requisites. Brief reference was made to the work accomplished by co-operation in Switzerland, France, Belgium, Italy, Germany, and more fully, in Denmark and Holland. In Denmark, he said, when the erection of dairy or cheese factories was contemplated, the necessary capital was borrowed, and guaranteed by the local farmers in proportion to the amount of milk to be supplied by each. Of late years no failures had occurred, which justified the assertion that the liability did not press hard upon the producers.

### CREDIT UNION BANKS.

Throughout Denmark there was a system of Credit Union Banks, which constituted a further semi-co-operative movement. No assistance was given by the State by means of guarantee or loan, but the banks were inspected and their accounts were continually audited by Government auditors. A credit union of landholders was formed with the object of securing for its members mortgages on their properties. The landholder who desired to raise an amount on his property gave a bond to the union and received the loan, not in cash, but in bonds issued by the union. These he realized by selling on the money market. The credit unions would advance loans up to half the assessed value of any property, and the person receiving the loan was required to pay a certain amount toward the reserve fund of the credit union by which it was granted, and also an additional proportion toward administrative expenses. Losses incurred were met out of the reserve fund first, and secondly, in equal proportion by members. The members were jointly and severally responsible for the obligations of the union.

The paper concluded with statistics illustrating the scope and advantage of co-operation.

* * *

# FARM COMPETITIONS.

The Naracoorte Branch of the Agricultural Bureau, prompted by a desire to foster an improvement in the agricultural practice of the district, has inaugurated a series of agricultural competitions for persons farming or residing within the boundaries of the District Council of Naracoorte. Prizes are being offered for—(1) The best worked and managed farm of an area of 500 acres or over; (2) the best worked and managed farm of an area less than 500 acres; (3) the best growing crop of wheat of not less than 25 acres in extent; (4) the best worked area of 25 acres or over of fallow land; (5) the best growing crop of Algerian oats of an area not less than 25 acres; and (6) the best kept orchard, vegetable and flower gardens, for owners of not more than 100 acres of land.

It is evident that this commendable attempt at improving the agricultural practice of the district will, if supported by landholders with that enthusiasm which it warrants, have a far-reaching effect.

The object of the promoters is perhaps best indicated by the system of point judging to be adopted in connection with those classes for the best worked and managed farms. The factors which are to be taken into consideration by the judges, and their respective point values, are as follows:—(1) The best system of cropping, including cultivation methods, rotations, and manures, 40; (2) the cleanest and best growing crops, 25; (3) the fallow in the best order—area to be considered, 20; (4) the best quality and serviceable class of stock kept on the farm (horses 25 points, sheep 20, cattle 15, pigs 5, and poultry 5), 70; (5) the most complete equipment and class of implements and machinery, 25; (6) the general care of implements, harness, and farm equipment, 20; (7) the best system of boundary and subdivisional fencing, and including gates, and sheep, horse, and cattle yards, 20; (8) the best arranged system for conveying surplus surface water from farm land, 20; (9) the best reserve of and provision for fodders, 25; (10) the best system for watering stock and for water supply, 20; (11) the best time and labor saving appliances and methods, 20; (12) the best arranged dwellings and outbuildings, 25; (13) the best arranged and kept orchard and vegetable garden, 10; (14) the best efforts at beautifying the homestead (tree planting, flower gardens, &c.), 10; (15) the best experimental work of any kind being conducted, 25—total, 375.

# ANALYSES OF FERTILISERS.

The following are the results of analyses made by the Government Agricultural Analyst (Mr. C. E. Chapman), of samples of fertilisers taken by inspector and assistant inspectors under the Fertilisers Act since the beginning of the present year :—

| Name of Firm and Fertiliser. | Phosphate. | | | | | | Nitrogen. | | Potash. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Water Soluble. | | Citrate Soluble. | | Acid Soluble. | | | | | |
| | Vendor's Guarantee | Result of Analysis. | Vendor's Guarantee | Result of Analysis. | Vendor's Guarantee | Result of Analysis. | Vendor's Guarantee | Result of Analysis. | Vendor's Guarantee. | Result of Analysis. |
| **Adelaide Chemical & Fertilisers Co., Ltd.**— | °/o | °/o | °/o | °/o | °/o | °/o | °/o | °/o | °/o | °/o |
| Mineral super. | 36·0 | 40·2 | — | — | — | — | — | — | — | — |
| Mineral super. (from Bee & Hill's store, Saddleworth) | 36·0 | 41·1 | — | — | — | — | — | — | — | — |
| Mineral super. (from Jas. Bell & Co.'s store, Wallaroo) | 36·0 | 41·1 | — | — | — | — | — | — | — | — |
| Mineral Super. (from Heinrich Bros.' store, Freeling) | 36·0 | 38·1 | — | — | — | — | — | — | — | — |
| Mineral super. | 36·0 | 37·6 | — | — | — | — | — | — | — | — |
| S.A. super. | 30·0 | 37·0 | — | — | — | — | — | — | — | — |
| S.A. super. (from Bee & Hill's store, Saddleworth) | 30·0 | 30·2 | — | — | — | — | — | — | — | — |
| S.A. super. (from Jas. Bell & Co.'s store, Wallaroo). | 30·0 | 29·8 | — | — | — | — | — | — | — | — |
| S.A. super. | 30·0 | 34·6 | — | — | — | — | — | — | — | — |
| Guano super. | 27·0 | 30·4 | 3·0 | 1·3 | 3·0 | 2·7 | — | — | — | — |
| Guano super. | 27·0 | 24·7 | 3·0 | 3·4 | 3·0 | 5·9 | — | — | — | — |
| Guano super. (from Bee & Hill's store, Saddleworth) | 27·0 | 29·3 | 3·0 | 3·7 | 3·0 | 5·7 | — | — | — | — |
| Guano super. (from Jas. Bell & Co.' store, Wallaroo) | 27·0 | 35·5 | 3·0 | 1·4 | 3·0 | 3·4 | — | — | — | — |
| Special bone manure | — | — | — | — | 17·50 | 10·2 | 2·40 | 0·90 | — | — |
| Bonedust | — | — | — | — | 43·00 | 42·7 | 3·25 | 3·9 | — | — |
| Bone super. | 15·0 | 14·4 | 15·0 | 8 8 | 4·0 | 11·3 | 1.60 | 2·2 | | |
| **Anders, E., & Sons**— | | | | | | | | | | |
| "Victor" bonedust | — | — | — | — | 40·00 | 42· | 3·00 | 4·4 | — | — |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Crompton & Son—** | | | | | | | | | | |
| Pure bonedust | — | — | — | — | 42·67 | 46·1 | 3·8 | 3·5 | — | — |
| Vineyard manure | — | — | — | — | 27·00 | 26·7 | 4·0 | 6·6 | — | — |
| **S.A. Fertiliser Co., Ltd.—** | | | | | | | | | | |
| Guano super. | 26·0 | 23·1 | 4·0 | 5·1 | 6·0 | 6·1 | — | — | — | — |
| Guano super. (from Bee & Hill's store, Saddleworth) | 26·0 | 26·1 | 4·0 | 5·5 | 6·0 | 5·6 | — | — | — | — |
| Guano super. (from Heinrich Bros.' store, Freeling) | 26·0 | 26·3 | 4·0 | 4·2 | 6·0 | 7·9 | — | — | — | — |
| No. 1 super. | 36·0 | 39·4 | — | — | — | — | — | — | — | — |
| No. 1 super. (from Bee & Hill's store, Saddleworth) | 36·0 | 39·2 | — | — | — | — | — | — | — | — |
| No. 1 super. (from Heinrich Bros.' store, Freeling) | 36·0 | 38·2 | — | — | — | — | — | — | — | — |
| Special super. | 45·0 | 46·4 | — | — | — | — | — | — | — | — |
| Special super. (from Heinrich Bros.' store, Freeling) | 45·0 | 46·0 | — | — | — | — | — | — | — | — |
| No. 2 super. (from Heinrich Bros.' store, Freeling) | 30·0 | 30·5 | — | — | — | — | — | — | — | — |
| Thomas phosphate | — | — | 28·0 | 36·4 | 12·0 | 2·7 | — | — | — | — |
| **Wallaroo-Mt. Lyell Fertilisers, Ltd.—** | | | | | | | | | | |
| Wallaroo-Mt. Lyell standard super. | 36·0 | 39·2 | — | — | — | — | — | — | — | — |
| Wallaroo-Mt. Lyell standard super. | 36·0 | 36·1 | — | — | — | — | — | — | — | — |
| Adelaide super. (Y.P.) | 30·0 | 32·2 | — | — | — | — | — | — | — | — |
| Adelaide super. (Y.P.) | 30·0 | 38·1 | — | — | — | — | — | — | — | — |
| L.I.G.E. (Lewis Island guano enricher) | 28·50 | 31·4 | 4·50 | 1·9 | 5·0 | 6·3 | 0·25 | ·4 | — | — |
| Guano super. | 27·0 | 29·2 | 3·0 | 1·2 | 3·0 | 2·3 | — | — | — | — |
| Wheat or barley manure | 28·0 | 27·0 | 5·0 | 1·8 | 3·0 | 4·1 | 1·05 | ·9 | — | — |
| Wallaroo-Mt Lyell standard super. (from Bee and Hill's store, Saddleworth) | 36·0 | 36·3 | — | — | — | — | — | — | — | — |
| Guano super. (from Bee & Hill's store, Saddleworth) | 27·0 | 26·1 | 3·0 | 5·0 | 3·0 | 4·8 | — | — | — | — |
| L.I.G.E. (Lewis Island guano enricher) (from Bee and Hill's store, Saddleworth) | 28·50 | 25·5 | 4·5 | 3·9 | 5·0 | 11·7 | ·25 | ·41 | — | — |
| Adelaide super. (Y.P.) (from Bee & Hill's store, Saddleworth) | 30·0 | 31·0 | — | — | — | — | — | — | — | — |
| Adelaide super. (Y.P.) (from Heinrich Bros.' store, Freeling) | 30·0 | 38·2 | — | — | — | — | — | — | — | — |
| Wallaroo-Mt. Lyell standard super. (from Heinrich Bros.' store, Freeling) | 36·0 | 35·8 | — | — | — | — | — | — | — | — |

August 1st, 1916.

GEO. QUINN, Inspector of Fertilisers, &c.

# THE 1915-16 WOOL CLIP.

The Government Statist (Mr. W. L. Johnston) has supplied particulars of the 1915-16 wool clip, as per returns from sheep farmers, and the estimated total wool production for the season under notice, as well as for the four previous seasons.

In so far as the number of sheep and lambs shorn is concerned it will be noted that in the five years just past there has been a most marked, and at the same time a regular, annual reduction. In 1911-12 6,248,714 sheep and lambs were shorn, but in 1915-16 the number that came under the shears was reduced to 3,601,861. The total clip for 1915-16 is given as 27,545,326lbs. (sheep, 26,330,005lbs.; lambs, 1,215,321lbs.), a noticeable reduction on the figures for 1911-12, viz., 51,360,794lbs. (sheep, 48,223,116lbs.; lambs, 3,137,678lbs.). It is also recorded that the average weight of fleece in 1915-16 (7.65lbs.) is lower than that of 1911-12 (8.22lbs.). The total production of wool for the State in 1915-16 (including the clip, wool fellmongered, and wool on local skins exported) is estimated at 33,969,975lbs., a considerable falling off in comparison with the figure for 1911-12, viz., 60,056,470lbs.

STATE OF SOUTH AUSTRALIA.

*Wool Clip, as per Returns from Sheep Farmers, and Estimated Total Wool Production—Season* 1915-16, *and Four Previous Seasons.*

| Division of State. | Sheep and Lambs Shorn. | Wool Clip. | | | |
|---|---|---|---|---|---|
| | | Sheep. | Lambs. | Total. | Average Weight of Fleece. |
| | No. | lbs. | lbs. | lbs. | lbs. |
| Central | 704,050 | 4,842,641 | 289,334 | 5,131,975 | 7·29 |
| Lower North | 598,206 | 4,728,823 | 173,371 | 4,902,194 | 8·19 |
| Upper North | 379,341 | 3,301.007 | 127,152 | 3,428,159 | 9·04 |
| South-Eastern | 886.444 | 5,376.173 | 233,421 | 5,609,594 | 6·33 |
| Western | 348,765 | 2,067,131 | 104,789 | 2,171,920 | 6·23 |
| Remainder State | 685,055 | 6,014,230 | 287,254 | 6,301,484 | 9·20 |
| Total clip— | | | | | |
| 1915-16 | 3,601,861 | 26,330,005 | 1,215,321 | 27,545,326 | 7·65 |
| 1914-15 | 4,323,094 | 28,716,176 | 1,470,593 | 30,186,769 | 6·98 |
| 1913-14 | 5,309,702 | 42,069,062 | 2,363,167 | 44,431,229 | 8·37 |
| 1912-13 | 5,810,731 | 44,211,499 | 1,999,976 | 46,211,475 | 7·95 |
| 1911-12 | 6,248,714 | 48,223.116 | 3,137,678 | 51,360,794 | 8·22 |
| | 1911-12.<br>lbs. | 1912-13.<br>lbs. | 1913-14.<br>lbs. | 1914-15.<br>lbs. | 1915-16.<br>lbs. |
| Wool clip | 51,360,794 | 46,211,475 | 44,431,229 | 30,186,769 | 27,545,326 |
| Wool fellmongered | 252,330 | 68,000 | 388,346 | 424,334 | 331,680 |
| Wool on local skins exported | 8,443,346 | 10,411,561 | 10,194,473 | 8,237,875 | 6,092,969 |
| Total wool production | 60,056,470 | 56,691,036 | 55,014,048 | 38,848,978 | 33,969,975 |

# SALE OF FRUIT ACT.

The measure under this title, passed last session by Parliament, and known more generally as the Standard Fruit Case Law, will come into force on October 1st next. The Act prescribes that, with certain exceptions, no fruit may be bought or sold within the State which is not contained within one or other of the seven cases whose dimensions are given herein. A "case" is defined as any box, case, or other receptacle used, intended to be used, or capable of being used, for containing fruit.

The Act forbids the use of any case which is not stamped in a legible and durable manner on one or both ends with the name and address of the maker, and the words "Guaranteed by maker to contain"—and then follows the true capacity, conforming with that particular case, as set out in the schedule, viz., 1bush., or ½bush., or certain cubic inches, as the maker may decide.

The exceptions to the fruits which have to be sold in these cases of standard sizes are—

(*a*) Dried, preserved, tinned, or canned.

(*b*) Fruit sold by weight, measure, or number, when each sale is under 20lbs.

(*c*) Sold in baskets, buckets, casks, tubs, or punnets.

(*d*) In trays containing one layer.

(*e*) Any particular fruit exempted by Proclamation.

(*f*) Fruit sold by weight to a person registered as a "Factory buyer" for the express purpose of being made up into articles of food or drink.

(*g*) Fruit sold to a person registered as an "Export buyer" at a price per standard case for the purpose of being repacked for export outside the State, beyond Cockburn, or to Broken Hill.

Any occupier of premises used for preparing articles of food or drink, and any agent of such person may, on compliance with prescribed conditions, be registered as a "Factory buyer," or any buyer of fruit for export may register as an "Export buyer." The registration is for one year, but may be renewed from time to time, and a registration may be cancelled by a magistrate who records a conviction against any factory or export buyer for infringing the law.

Factory buyers must keep a record and submit same to any inspector on demand. The factory buyer's records must show—

(1) The name and address of the person from whom every lot of fruit was purchased.

(2) The date when purchased.

(3) The weight of each kind of fruit included in the purchase, whether delivered at the factory or not.

(4) The weight of each kind of such fruit which has been delivered at the factory.

(5) Such other particulars as may be required.

The export buyer's record must show—

(1) The name and address of the seller and the date when the fruit was purchased.

(2) The quantity stated in standard bushel cases of each variety of such fruit which is to be exported to each place.

(3) The places to which such fruit is to be exported and the quantity stated in standard bushel cases of each variety of each kind of such fruit which is to be exported to each place.

(4) Any other particulars as are prescribed.

The occupier of any premises may, on application and complying with prescribed conditions, register once during each year such premises as a packing store for the purpose of this Act.

Inspectors are empowered to enter any premises during the daytime where fruit is, or may reasonably be supposed to be sold or be packed, or be kept for sale, and may measure any case whether containing fruit or not, and may remove same for further measurement, or do any other act prescribed by regulations.

The following are the standard cases fixed in the schedule :—

## SALE OF FRUIT ACT, 1915.

*The Schedule.—Standards for Fruit Cases.*

| Name of Case. | Description of Case. | |
|---|---|---|
| | Inside Measurements, Clear of all Divisions. | Capacity. |
| Bushel case ...... | Eighteen inches by fourteen and one-quarter inches by eight and two-thirds inches | Not less than one imperial bushel or cubical content of two thousand two hundred and twenty-three cubic inches. |
| Bushel case ...... | Twenty-six inches by six inches by fourteen and one-quarter inches | Not less than one imperial bushel or cubical content of two thousand two hundred and twenty-three cubic inches. |
| Bushel case ...... | Twenty inches by ten inches by eleven and one-eighth inches | Not less than one imperial bushel or cubical content of two thousand two hundred and twenty-five cubic inches. |
| Half-case ........ | Eighteen inches by eight and two-thirds inches by seven and one-eighth inches | Not less than one-half imperial bushel or cubical content of one thousand one hundred and eleven and one-half cubic inches. |
| Half-case ........ | Twenty-six inches by six inches by seven and one-eighth inches | Not less than one-half imperial bushel or cubical content of one thousand one hundred and eleven and one-half cubic inches. |
| Half-case ........ | Eighteen inches by eleven and three-quarters inches by five and one-quarter inches | Not less than one-half imperial bushel or cubical content of one thousand one hundred and ten cubic inches. |
| Quarter-case ..... | Thirteen and three-quarters inches by ten and one-eighth inches by four inches | Not less than one-quarter imperial bushel or cubical content of five hundred and fifty-six and seven-eighths cubic inches. |

Provision is made for minor variations by section 7, wherein if a fruit case is of the shape necessary in order to comply with the measurements prescribed for any of the standard cases, such case shall be deemed to be of the prescribed measurements if any excess or deficiency in the cubic capacity of such case does not exceed, on the whole, 2½ per cent. of the cubic capacity prescribed for the said standard case. The question has been raised whether the kerosine case may be used in the manufacture of any of those named in the schedule. This is quite permissible. Regulations will be published shortly prescribing the necessary procedure for registration of buyers and other matters provided for in the Act.

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## DAIRY AND FARM PRODUCE MARKETS.

A. W. Sandford & Co., Limited, report on August 1st:—

**Butter.**—The weather during July was exceptionally favorable throughout the whole State, and as anticipated a month ago, production of dairy produce has increased substantially. Prices have receded here even to a greater degree than in the eastern States, so that at the end of the month "Alfa" was 1s. 6½d.; "Primus," 1s. 6d.; choice separators and dairies, 1s. 3d. to 1s. 4d.; store and collectors', 10½d. to 1s. per lb.

**Eggs.**—The season in this line still gives every promise of being an extensive one. Values fluctuated somewhat during July, the weather at times being cold and boisterous. A little export trade is still being done, prices now being:—Hen, 1s. 1½d.; duck, 1s. 2½d. per dozen.

**Cheese.**—Quantities have kept up well, but prices are easier in sympathy with the lower rates ruling for butter. Local demand is good, and fair export trade continues. Present prices are 8½d. to 9d. per lb. for large to loaf.

**Honey.**—Throughout the month sales have been rather slow. However, the market has only declined slightly, the range being from 4½d. to 5d. per lb. for prime clear extracted samples; second grades 3d. to 3½d.; beeswax wanted at 1s. 5d. to 1s. 6d. per lb.

**Almonds.**—Only odd consignments coming forward, which are readily placed at:—Brandis, 9½d.; mixed softshells, 8½d.; hardshells, 4d.; kernels, 1s. 5d.

**Bacon** has been more plentiful, and the lowering in rates has caused much heavier consumption; best factory cured sides selling at 11d. to 1s.; hams, 1s. to 1s. 0½d. per lb.

**Live Poultry.**—Good supplies have been marketed throughout the month, the numbers coming forward being substantially ahead of the corresponding period of last year, and good prices ruled throughout. Heavyweight table roosters fetched 3s. 6d. to 3s. 10d. each; nice conditioned cockerels, 2s. 6d. to 3s. 3d.; plump hens, 2s. 3d. to 3s.; ducks, 2s. 9d. to 4s.; geese, 5s. to 6s.; pigeons, 7½d. each; turkeys, from 9½d. to 10d. per lb. live weight for good to prime table birds; fair quality, 8d. to 9d. per lb.

**Potatoes and Onions.**—The Adelaide market has been almost wholly supplied from the Ballarat district, and prices have advanced in sympathy with the rise in Victoria. **Onions.**—The market continues to rule steady, and apart from a few locally produced lines, our requirements have been imported from the Colac district of Victoria. Quotations:—Potatoes—Prime Snowflakes, £8 10s. to £9 per ton of 2,240lbs. on trucks Mile End or Port Adelaide. Onions—£5 10s. per ton of 2,240lbs. on trucks Mile End or Port Adelaide.

# THE AGRICULTURAL OUTLOOK.

## REPORT FOR MONTH OF JULY.

The following reports on the general agricultural condition and outlook of the areas represented by the Government Experimental Farms mentioned below have been prepared by the respective managers:—

*Booborowie.*—Weather—The weather has been very stormy and boisterous. The rainfall has been very good, but total fall has varied very considerably on adjoining farms. Crops—Seeding is finished. A fair quantity of wheat was sown late in June and early in July. The area in crop this year is hardly as large as last year. Natural feed has been going off; the extreme cold has stopped the growth. Stock is in fair condition, but the lambs in many cases are receiving a check. Pests—Foxes are numerous, and are doing much harm amongst some flocks. Miscellaneous—There is a general feeling that this year will be a good one. The rains, though late, are nice and steady.

*Eyre's Peninsula.*—Weather—The weather has been cold and wintry, interspersed with fine sunny days. Good rains have been registered; over 3½in. for the month, as against 2¼in. for July, 1915. A few slight frosts and heavy fogs were recorded. Crops are making good use of the splendid weather conditions, and though naturally irregular in growth on the new land, are covering the ground well, and have a very healthy appearance. Natural Feed—Geraniums and small native grasses are showing thickly, but short; the tufts of the spear grasses provide stock with a fair picking of green. Stock—One case of strangles has broken out, otherwise stock are very healthy. Miscellaneous—All concrete tanks of the district are now full and overflowing. Clearing operations are in full swing on most occupied sections.

*Kybybolite.*—Weather conditions have been mild and calm generally, no particularly windy or cold weather being experienced. The 259 points of rain for the month to date is a comparatively light fall. Crops are making very satisfactory growth, and show an unusually good color for this time of year, when, under average conditions, there is a great excess of moisture. Natural feed is making slow growth, and, of course, is improving in quality as it matures. Stock generally are in very fair order and healthy. Autumn lambs have been marked, and the percentages range from 85 to 93 on the different holdings. Miscellaneous—Fallowing has not yet been commenced, except in a very few instances.

*Turretfield.*—Weather—The weather during the month of July was, on the whole, seasonable. The rainfall recorded was just 2in., distributed well over the period; no single fall being over ½in. Three heavy and two light frosts were experienced. On the night of the 17th a very heavy wind blew with hurricane force, but beyond the unroofing of a few sheds and uprooting a number of trees no serious damage resulted. All crops are making good headway, and are showing a fine, healthy color. Early-sown fields have a larger proportion of weeds than those sown later. Natural feed is becoming plentiful, but is not nearly of so rank a growth as last season. Stock are healthy and looking well. The lambs are growing rapidly. Pests—Foxes, though fairly numerous, are not causing any casualties amongst the lambs. Sparrows and starlings are very much in evidence, but at the present season of the year can do no harm. Rabbits are scarce. Miscellaneous—Fallowing has become general, and farmers are pushing on with this work as rapidly as circumstances will permit. The soil is now so sodden that even light rains bring down the North Para in flood. Land slips on the banks are numerous, while many old gum trees along the course of the river are being washed out. Some damage has also been done to fences through the floods.

*Veitch.*—Weather—A splendid month for rain in this district has been experienced. The gauge registered 241 points up to date (the 28th)—average for month, 98 points. Between rains we have had a few fine days followed by very cold nights. Crops—All crops in the district sown reasonably early are making splendid growth, and look promising. Crops sown on fallowed ground are showing to advantage. Natural feed is germinating well, barley grass especially. Stock are all in good healthy condition. Miscellaneous—Fallowing operations are going ahead well.

## RAINFALL TABLE.

The following figures, from data supplied by the Commonwealth Meteorological Department, show the rainfall for the month of and to the end of July, 1916, also the average precipitation to the end of July, and the average annual rainfall.

| Station. | For July, 1916. | To end July, 1916. | Av'ge. to end July | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| **Far North and Upper North.** | | | | |
| Oodnadatta | 0·42 | 5·75 | 3·20 | 4·76 |
| Tarcoola | 1·78 | 2·94 | 4·26 | 7·58 |
| Hergott | 1·47 | 2·42 | 3·75 | 6·04 |
| Farina | 2·06 | 3·71 | 4·20 | 6·70 |
| Leigh's Creek | 2·21 | 3·39 | 5·39 | 8·66 |
| Beltana | 2·24 | 4·25 | 5·67 | 9·22 |
| Blinman | 3·73 | 7·07 | 8·09 | 12·83 |
| Hookina | 4·44 | 9·68 | — | — |
| Hawker | 5·88 | 10·23 | 7·14 | 12·22 |
| Wilson | 6·79 | 10·24 | 7·07 | 11·78 |
| Gordon | 4·77 | 7·59 | 5·89 | 10·26 |
| Quorn | 6·15 | 10·61 | 7·90 | 13·78 |
| Port Augusta | 2·36 | 5·42 | 5·59 | 9·46 |
| Port Augusta W. | 2·52 | 5·33 | 5·30 | 9·36 |
| Bruce | 3·63 | 6·44 | 5·78 | 10·01 |
| Hammond | 3·36 | 6·67 | 6·51 | 11·46 |
| Wilmington | 5·36 | 12·24 | 10·64 | 18·26 |
| Willowie | 3·46 | 7·57 | 6·90 | 11·90 |
| Melrose | 7·96 | 17·35 | 13·86 | 23·04 |
| Booleroo Centre | 4·27 | 9·78 | 9·01 | 15·83 |
| Port Germein | 2·07 | 6·32 | 7·52 | 12·84 |
| Wirrabara | 6·14 | 14·94 | 11·09 | 18·91 |
| Appila | 4·37 | 8·55 | 8·55 | 15·08 |
| Cradock | 3·78 | 6·56 | 6·36 | 10·86 |
| Carrieton | 4·36 | 8·85 | 6·94 | 12·22 |
| Johnburg | 3·04 | 6·15 | 5·64 | 10·21 |
| Eurelia | 3·77 | 8·49 | 7·42 | 13·24 |
| Orroroo | 4·01 | 9·20 | 7·89 | 13·42 |
| Black Rock | 3·42 | 8·25 | 7·05 | 12·25 |
| Petersburg | 3·49 | 8·21 | 7·25 | 13·07 |
| Yongala | 3·84 | 9·52 | 7·59 | 13·94 |
| **North-East.** | | | | |
| Ucolta | 3·80 | 6·89 | — | — |
| Nackara | 3·65 | 6·11 | — | — |
| Yunta | 2.11 | 4.13 | 4.79 | 8·22 |
| Waukaringa | 2·67 | 4·82 | 4·65 | 7·94 |
| Mannahill | 2·85 | 4·96 | 4·86 | 8·46 |
| Cockburn | 3·24 | 5·52 | 4·87 | 7·97 |
| Broken Hill, NSW | 3·06 | 4·69 | 5·73 | 9·63 |
| **Lower North.** | | | | |
| Port Pirie | 2·97 | 8·23 | 8·88 | 13·21 |
| Port Broughton | 4·91 | 11·25 | 8·61 | 14·33 |
| Bute | 4·25 | 11·41 | 9·36 | 15·42 |
| Laura | 4·57 | 11·84 | 10·34 | 18·22 |
| Caltowie | 3·06 | 9·82 | 9·48 | 17·27 |
| Jamestown | 3·80 | 11·10 | 9·62 | 17·46 |
| Gladstone | 3·31 | 9·21 | 8·96 | 16·00 |
| Crystal Brook | 4·29 | 10·43 | 8·97 | 15·62 |
| Georgetown | 3·93 | 11·85 | 10·53 | 18·32 |
| Narridy | 2·84 | 8·95 | 8·63 | 16·79 |
| Redhill | 3·91 | 11·42 | 10·85 | 16·79 |
| **Lower North—*continued.*** | | | | |
| Spalding | 3·98 | 13·17 | 11·10 | 20·25 |
| Gulnare | 3·43 | 12·31 | 10·94 | 19·74 |
| BundaleerW.Wks. | 3·06 | 12·41 | 9·39 | 17·29 |
| Yacka | 2·39 | 9·87 | 8·77 | 15·27 |
| Koolunga | 2·67 | 10·14 | 9·27 | 15·94 |
| Snowtown | 3·81 | 11·93 | 9·25 | 15·70 |
| Brinkworth | 2·40 | 11·02 | 8·87 | 15·48 |
| Blyth | 2·56 | 11·01 | 9·58 | 16·34 |
| Clare | 4·00 | 17·26 | 14·24 | 24·30 |
| Mintaro Central | 4·16 | 16·76 | 12·36 | 21·99 |
| Watervale | 4·30 | 17·61 | 15·69 | 27·17 |
| Auburn | 2·85 | 13·33 | 14·16 | 24·25 |
| Hoyleton | 1·97 | 9·00 | 10·46 | 17·96 |
| Balaklava | 2·04 | 8·04 | 9·38 | 16·03 |
| Port Wakefield | 3·17 | 9·19 | 8·19 | 13·13 |
| Terowie | 2·72 | 6·97 | 8·47 | 13·71 |
| Yarcowie | 2·70 | 8·28 | 7·80 | 13·91 |
| Hallett | 2·87 | 8·52 | 9·01 | 16·40 |
| Mount Bryan | 3·99 | 12·52 | 8·84 | 15·73 |
| Burra | 4·95 | 13·73 | 10·27 | 17·82 |
| Farrell's Flat | 2·93 | — | 10·86 | 18·87 |
| **West of Murray Range.** | | | | |
| Manoora | 3·18 | 11·40 | 10·13 | 18·09 |
| Saddleworth | 2·28 | 10·24 | 11·49 | 19·69 |
| Marrabel | 4·46 | 14·37 | 10·81 | 18·94 |
| Riverton | 2·78 | 14·64 | 11·84 | 20·48 |
| Tarlee | 2·09 | 11·46 | 9·96 | 17·48 |
| Stockport | 2·06 | 12·21 | 9·01 | 15·89 |
| Hamley Bridge | 1·99 | 11·43 | 9·51 | 16·45 |
| Kapunda | 3·45 | 14·18 | 11·38 | 19·67 |
| Freeling | 2·65 | 13·36 | 10·16 | 17·85 |
| Greenock | 4·55 | 17·72 | 12·03 | 21·46 |
| Truro | 3·64 | 14·52 | 11·20 | 19·74 |
| Stockwell | 3·80 | 14·60 | 11·48 | 20·30 |
| Nuriootpa | 3·24 | 15·78 | 12·08 | 21·25 |
| Angaston | 4·34 | 17·03 | 12·60 | 22·25 |
| Tanunda | 3·13 | 16·08 | 12·91 | 22·28 |
| Lyndoch | 2·57 | 13·97 | 13·46 | 23·01 |
| **Adelaide Plains.** | | | | |
| Mallala | 1·99 | 9·74 | 9·91 | 16·88 |
| Roseworthy | 2·11 | 11·08 | 10·05 | 17·31 |
| Gawler | 2·49 | 14·18 | 11·36 | 19·21 |
| Two Wells | 2·05 | 10·88 | 9·97 | 16·36 |
| Virginia | 2·35 | 11·73 | 10·52 | 17·58 |
| Smithfield | 1·84 | 12·17 | 10·13 | 17·30 |
| Salisbury | 2·33 | 13·64 | 11·17 | 18·57 |
| North Adelaide | 4·09 | 18·41 | 12·96 | 21·49 |
| Adelaide | 3·30 | 16·05 | 12·76 | 21·04 |
| Brighton | 2·91 | 15·50 | 12·01 | 19·93 |
| Glenelg | 2·88 | 13·84 | 11·20 | 18·35 |

## RAINFALL—*continued.*

### ADELAIDE PLAINS—*continued.*

| Station. | For July, 1916 | To end July, 1916 | Av'ge. to end July. | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| Magill | 2·41 | 14·83 | 16·79 | 25·69 |
| Glen Osmond | 3·53 | 19·96 | 15·34 | 25·26 |
| Mitcham | 3·12 | 17·45 | 14·37 | 23·47 |
| Belair | 3·55 | 8·10 | 17·65 | 28·64 |

### MOUNT LOFTY RANGES.

| Station. | For July, 1916 | To end July, 1916 | Av'ge. to end July. | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| Teatree Gully | 3·74 | 18·19 | 17·11 | 28·19 |
| Stirling West | 6·14 | 31·85 | 28·07 | 46·70 |
| Uraidla | 6·26 | 31·45 | 26·88 | 44·35 |
| Clarendon | 4·38 | 22·80 | 20·24 | 33·67 |
| Morphett Vale | 3·16 | 15·81 | 14·04 | 23·32 |
| Noarlunga | 3·49 | 13·76 | 12·42 | 20·28 |
| Willunga | 4·02 | 17·88 | 15·80 | 25·98 |
| Aldinga | 3·12 | 13·86 | 12·44 | 20·34 |
| Normanville | 4·25 | 16·53 | 12·83 | 20·65 |
| Yankalilla | 5·21 | 18·90 | 14·45 | 22·78 |
| Cape Jervis | 2·57 | 10·73 | 10·41 | 16·34 |
| Mount Pleasant | 5·30 | 19·04 | 15·84 | 26·87 |
| Blumberg | 4·73 | 20·04 | 17·45 | 29·38 |
| Gumeracha | 5·03 | 21·70 | 19·45 | 33·30 |
| Lobethal | 6·40 | 25·41 | 20·93 | 35·38 |
| Woodside | 4·98 | 19·55 | 18·56 | 31·87 |
| Hahndorf | 5·16 | 19·65 | 20·64 | 35·45 |
| Nairne | 4·20 | 15·53 | 16·95 | 28·83 |
| Mount Barker | 4·45 | 19·85 | 18·13 | 30·93 |
| Echunga | 4·28 | 20·13 | 19·58 | 32·83 |
| Macclesfield | 4·83 | 19·09 | 17·76 | 30·72 |
| Meadows | 5·97 | 24·58 | 20·90 | 35·52 |
| Strathalbyn | 3·10 | 12·10 | 11·40 | 19·28 |

### MURRAY FLATS AND VALLEY.

| Station. | For July, 1916 | To end July, 1916 | Av'ge. to end July. | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| Wellington | 1·85 | 8·01 | 8·70 | 15·01 |
| Milang | 1·95 | 7·52 | 9·86 | 16·08 |
| Langhorne's Brdg | 1·68 | 7·23 | 8·89 | 15·27 |
| Tailem Bend | 1·83 | 8·10 | — | — |
| Murray Bridge | 1·59 | 6·74 | 8·36 | 14·32 |
| Callington | 2·47 | 8·24 | 9·16 | 15·65 |
| Mannum | 2·42 | 5·75 | 7·00 | 11·67 |
| Palmer | 2·56 | 8·64 | 8·73 | 15·60 |
| Sedan | 2·46 | 7·97 | 6·97 | 11·92 |
| Blanchetown | 1·27 | 3·34 | 6·20 | 10·71 |
| Eudunda | 4·10 | 11·56 | 9·88 | 17·33 |
| Sutherlands | 2·59 | 7·09 | 5·92 | 10·60 |
| Morgan | 2·23 | 4·10 | 5·08 | 9·29 |
| Overland Corner | 1·52 | 3·47 | 6·36 | 11·42 |
| Renmark | 1·85 | 4·39 | 6·76 | 10·93 |
| Loxton | 2·19 | 6·27 | — | — |

### WEST OF SPENCER'S GULF.

| Station. | For July, 1916 | To end July, 1916 | Av'ge. to end July. | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| Eucla | 2·45 | 5·89 | 6·64 | 10·13 |
| White Well | 3·28 | 8·37 | 5·58 | 9·67 |
| Fowler's Bay | 4·30 | 9·73 | 8·15 | 12·11 |
| Penong | 6·44 | 12·84 | 7·70 | 11·93 |
| Murat Bay | 3·07 | 8·36 | — | — |
| Smoky Bay | 3·46 | 8·87 | — | — |

### WEST OF SPENCER'S GULF—*continued.*

| Station. | For July, 1916. | To end July, 1916. | Av'ge. to end July. | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| Streaky Bay | 3·66 | 10·60 | 9·99 | 15·31 |
| Port Elliston | 3·11 | 12·77 | 10·63 | 16·49 |
| Port Lincoln | 4·80 | 15·95 | 12·42 | 19·88 |
| Tumby | 3·74 | 10·43 | 9·20 | 15·00 |
| Carrow | 4·09 | 10·47 | — | — |
| Cowell | 2·45 | 5·76 | 7·05 | 11·76 |
| Point Lowly | 3·07 | 6·54 | 6·93 | 12·21 |

### YORKE'S PENINSULA.

| Station. | For July, 1916. | To end July, 1916. | Av'ge. to end July. | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| Wallaroo | 3·83 | 10·80 | 8·83 | 14·05 |
| Kadina | 4·47 | 12·08 | 9·95 | 15·88 |
| Moonta | 4·26 | 12·40 | 9·65 | 15·22 |
| Green's Plains | 3·38 | 10·65 | 9·58 | 15·73 |
| Maitland | 5·82 | 17·52 | 12·30 | 20·08 |
| Ardrossan | 3·73 | 10·87 | 8·40 | 13·89 |
| Port Victoria | 3·73 | 12·91 | 9·49 | 15·20 |
| Curramulka | 4·02 | 13·24 | 11·13 | 18·51 |
| Minlaton | 4·81 | 14·96 | 10·56 | 17·41 |
| Stansbury | 3·24 | 11·30 | 10·31 | 17·06 |
| Warooka | 3·93 | 13·06 | 10·90 | 17·71 |
| Yorketown | 2·97 | 12·79 | 10·53 | 17·47 |
| Edithburgh | 3·56 | 13·19 | 10·10 | 16·48 |

### SOUTH AND SOUTH-EAST.

| Station. | For July, 1916. | To end July, 1916. | Av'ge. to end July. | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| Cape Borda | 5·48 | 16·98 | 16·44 | 25·09 |
| Kingscote | 5·10 | 14·72 | 11·94 | 18·95 |
| Penneshaw | 3·82 | 14·06 | 13·44 | 21·34 |
| Cape Willoughby | 4·71 | 17·10 | 11·91 | 19·69 |
| Victor Harbor | 2·83 | 11·58 | 13·57 | 22·18 |
| Port Elliot | 2·88 | 10·59 | 12·26 | 20·33 |
| Goolwa | 2·99 | 11·92 | 10·85 | 17·93 |
| Pinnaroo | 2·47 | 7·97 | 9·29 | 16·74 |
| Parilla | 2·59 | 9·96 | — | — |
| Lameroo | 2·78 | 9·88 | 9·19 | 16·55 |
| Parrakie | 2·09 | 7·82 | — | — |
| Geranium | 2·84 | 9·71 | — | — |
| Peake | 2·49 | 9·63 | — | — |
| Cooke's Plains | 1·90 | 10·06 | 8·45 | 14·74 |
| Meningie | 2·13 | 13·45 | 11·28 | 18·87 |
| Coomandook | 2·92 | 11·40 | — | 17·49 |
| Coonalpyn | 2·62 | 11·25 | 10·16 | 16·80 |
| Tintinarra | 2·91 | 11·31 | 10·84 | 18·78 |
| Keith | 2·56 | 10·46 | — | — |
| Bordertown | 2·06 | 10·26 | 11·09 | 19·76 |
| Wolseley | 1·75 | 10·10 | 9·98 | 17·72 |
| Frances | 2·40 | 9·58 | 11·31 | 20·74 |
| Naracoorte | 2·98 | 11·85 | 12·83 | 22·60 |
| Penola | 2·61 | 13·69 | 15·30 | 26·78 |
| Lucindale | 2·52 | 12·94 | 13·66 | 23·32 |
| Kingston | 3·69 | 14·56 | 15·22 | 24·73 |
| Robe | 4·03 | 20·08 | 15·44 | 24·69 |
| Beachport | 5·31 | 21·15 | 17·66 | 27·51 |
| Millicent | 3·85 | 20·69 | 18·02 | 29·25 |
| Mount Gambier | 3·67 | 17·17 | 18·50 | 32·00 |
| C. Nrthumberland | 3·43 | 15·75 | 16·06 | 26·63 |

# THE AGRICULTURAL BUREAU.

## CONFERENCE OF UPPER NORTHERN BRANCHES.

The Branches of the Agricultural Bureau constituting the Upper Northern District met in Conference at Orroroo on Friday, July 14th. The Minister of Agriculture (Hon. C. Goode, M.P.), the Horticultural Instructor (Mr. Geo. Quinn), Poultry Expert (Mr. D. F. Laurie), Messrs. F. Coleman (Chairman), G. Jeffrey, and H. J. Finnis (Acting Secretary of the Advisory Board of Agriculture), attended, and in addition a representative gathering of delegates.

Proceedings were opened by a pruning demonstration in the garden of Mr. J. Hagger, where the Horticultural Instructor gave a practical lesson in pruning grape vines and fruit trees, and explained at length the principles underlying the art of pruning.

The first session of the Conference was begun at 2 p.m., and was presided over by Mr. N. J. Neylon, who introduced the Minister of Agriculture, and called on the Minister to open the Conference.

### OPENING ADDRESS.

The Hon. C. Goode, M.P., expressed his pleasure at being present, and after referring to the value of the work being done by the Bureau, and the necessity for producers exercising every endeavor to secure from the land the greatest possible return, mentioned that if the man on the land were making a success of his operations, secondary industries also would feel the impetus, and there would be more general prosperity and room for a larger population. They could largely contribute in that direction by means of closer settlement, and the Government had, by a purchase of the Mount Remarkable Estate, assisted towards that end.

### AGGREGATION OF HOLDINGS IN THE NORTH.

A proposal had been put before the Government in regard to certain areas in the North, that they should take steps to secure an aggregation of holdings, in such a way as to enable one man, under easy terms, to buy out one or two of his neighbors, in order that he might eventually be in possession of sufficient land to enable him to secure a living from grazing. Under existing circumstances he was opposed to that, on the grounds that the scarcity of stock made it unwise, for whilst a man might be able to secure the land, he might not be able to secure the necessary stock. Hence, however desirable the suggested reform might be in the general way, that was a practical difficulty which made it inopportune at the present.

The question of the increase in the number of stock was of the utmost importance, and he intended having experiments conducted with the idea of ascertaining whether they could, by artificially feeding, keep ewes in a condition fit for breeding for a much longer period than was generally the case at present. That was one direction in which they might be able to facilitate the increase in their flocks, and the possibilities were considerable, as he believed that it was recorded that an ewe had been utilised for breeding until she had reached an age of 25 years.

### THE WHEAT SCHEME.

The speaker traversed the history of the scheme adopted for the marketing of the 1915 harvest, and explained the reasons that prompted the Governments of the participating States in adopting it.

### BULK HANDLING OF WHEAT.

At the 1913 Congress of the Agricultural Bureau, he said, a resolution to the following effect had been passed by a large majority:—"That this Congress urge the Government to take such steps as may be necessary to make bulk handling of wheat the ordinary process of marketing in this State."

The Government had now taken steps to secure plans and specifications for a system of wheat elevators, and a Bill would be introduced into Parliament asking authority to have these elevators constructed. All the wheat-producing States were in line in that action, and that fact ensured the attraction of the right class of shipping to carry the grain.

Canada, Argentine, and the United States of America, had been shipping a great part of their wheat in bulk, and if it paid those countries it should pay Australia to do likewise. It had been urged that whilst those countries, with their large crops, could profitably handle their wheat in bulk, the smaller production of Australia would make the system unprofitable here, but the normal Australian crop in the future was going to be very much greater than that of the past. The large number of outports that they had in South Australia was certainly a difficulty, but by no means an insurmountable one. As a matter of fact, under the bag system of handling, South Australian wheat was selling at about 1d. per bushel lower than that of the other States, on account of the number of outports, and the extra handling involved, and under the bulk system there was no reason to believe that the difference would be any greater.

There was no doubt that the internal handling could be done in bulk; as a matter of fact, some farmers in the Commonwealth were to-day reaping their wheat, handling it in bulk in the paddocks, and then carrying it to the mills in bulk, thus dispensing altogether with the bags.

### A CLEANER SAMPLE.

The proposed scheme would encourage the production of a cleaner sample of grain. At the elevator the grain would be graded and paid for according to its quality. The freight on tons of screenings, &c., would thus be saved, and the stuff would remain in the Commonwealth to be used as stock food. There was no doubt as to the wisdom of adopting two grades for Australian wheat, and without the elevator system, that was impracticable.

Australian wheat generally sold at about 1½d. per bushel below the Manitoba grain. Whilst it was admitted that the American hard wheat had its special value on account of gluten content, against that was the fact that Australian grain was necessary on account of its color. With the adoption of the bulk handling, and the two grades, Australian No. 1 grade would be of the same weight per bushel from year to year, thus engendering confidence on the part of the buyers, and it could be reasonably assured that the Australian grain would command quite as much, if not more, than the highest grades of red wheat.

### SAVING THE COST OF BAGS.

The saving that would be effected in the direction of a reduction in the number of cornsacks required was very considerable, for on a 30,000,000bush. crop selling at 3s. 6d. per bushel, with bags at 9s. per dozen, the farmer's outgoings for bags represented £309,375, and with wheat at 2s. 6d. per bushel and bags at 7s. 6d. per dozen, he had to lay out £265,625. He believed the time was coming when South Australia would produce 90,000,000bush. of wheat as easily as they could now produce 30,000,000bush.

Another important factor was that the damage to the wheat by weather, mice, and weevil could be very easily controlled with the wheat elevators, and the loss to the community would then be reduced to a minimum.

It was anticipated that even if freights were not reduced, there would certainly be no increase in the rates for wheat in bulk, as the very considerable reduction in the time necessary for loading the vessels would make it possible for shipowners to reduce their rates.

The so-called "free storage" would be superseded by a system that would be of considerable advantage to the wheatgrower. The elevators would be under the control of the Government, and the grower, on delivering his grain, would receive a certificate for the amount of wheat of the particular grade that he delivered. That certificate would be a negotiable instrument; it could be sold outright, or, if the farmer so preferred, he could hold it in anticipation of a rise in the market price, at the same time securing an advance against it from the bank.

### MORE LABOR FOR THE FARMER.

Labor which was under the present system employed in shipping operations, and in handling the bagged wheat in the country, could be released, and made available for the farmers. The large profits which were being made by the grain merchants would be distributed more widely, and a greater proportion would go to the farmer.

### A PLEASING DUTY.

The Hon. Minister, at the request of the Chairman, presented to Mr. T. H. P. Tappscott, a certificate of life membership of the Agricultural Bureau. Mr. Tappscott has been a member of the organisation for a period of over 22 years, and during that time had rendered signal service to the Orroroo Branch, of which he was Hon. Secretary for some years.

## POISONING FOXES.

In a short paper, Mr. Noll, of the Quorn Branch, expressed the opinion that poisoning would readily get rid of foxes. The method of effecting their destruction which he advocated, was to shoot or otherwise secure birds, preferably ring-necked parrots, and whilst they were still warm, put into the mouth of each as much strychnine as would lie on the small blade of an ordinary pocketknife. On no account should the bird be touched with the human hand—plyers should be used. Some strong-smelling animal matter should be dragged around the fowlhouse or sheep pens which the foxes visited, at a distance of a quarter of a mile. That should be done about sunset, and a bait should be dropped at intervals along the trail. The use of birds as baits lessened the danger of poisoning domestic dogs. Mr. Key, of the Carrieton Branch, in discussing the paper, said the practice outlined had proved successful in dealing with foxes, but the wild dog was more wary and difficult to poison.

## SHEEP AND WOOL FOR THE FARMER.

"A few years ago it was a general practice not to use either rams or ewes for breeding purposes until they were four-tooth," said Mr. J. F. Burns, of the Wepowie Branch. However, of late it was not uncommon to breed from two-tooth ewes and lambs, and fairly satisfactory results had followed except in the cold, wet districts. Whilst the younger ewes were admittedly inferior mothers, if they were given a sufficiency of food and water, and care and attention, the results justified their use as breeders. The writer of the paper described the points of the Merino ram, and gave a number of points in regard to the general management of the farm flock.

Mr. Geo. Jeffrey (member Advisory Board), in commenting on the paper, said that generally speaking the Merino ram would be found the most useful in that district. Careful consideration should be given to the quality of the ewes. The Merino best suited to their conditions was the big-framed sheep, as constitution was of the utmost importance. That would be found generally to accompany the bolder wool. In regard to the suggestion that steps should be taken to prevent the slaughter of female stock, they should recognise that in some cases, and on some of the holdings, it was necessary for the owners to dispose of their sheep immediately they got them fat, irrespective of whether they were ewes or wethers. The use of two-tooth ewes for breeding was a wise practice to resort to under present conditions.

Mr. Brice (Orroroo) had tried the English breeds, and they had done well.

Mr. F. Coleman (Chairman Advisory Board) agreed that this was a Merino district, but suggested that owners might with advantage try the English breeds, particularly the Leicester, which crossed with the Merino, produced a good market lamb.

## HORTICULTURE.

The Horticultural Instructor (Mr. Geo. Quinn) then addressed the gathering on the subjects of planting fruit trees, the prevention of codlin moth, and the treatment of scale on citrus trees. At the close of his address Mr. Quinn answered a number of inquiries.

## THRESHING.

Mr. J. E. Pearce, of the Wepowie Branch, contributed a paper, in which he pointed out the benefit the farmer secured in the way of a reserve of fodder by threshing part of the crop, and stacking the straw. Barley particularly could be most advantageously treated in that manner.

## POULTRY.

The evening session, which was particularly well attended, was devoted principally to the question of the poultry industry, the Poultry Expert (Mr. D. F. Laurie) addressing the gathering.

## NEXT CONFERENCE.

It was decided that the next Conference should be held at Quorn.

The Conference closed, after votes of thanks to the Minister of Agriculture and visiting officers and delegates, with the singing of the National Anthem.

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* No report received during the month of July. † Formal report only received. ‡ Held over until next month.

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# ADVISORY BOARD OF AGRICULTURE.

## Dates of Meetings—
## August 9th and September 13th, 1916.

**[A large number of Branches have, during the past month, held their annual meetings, and, as a general rule, where the only business transacted has been the presentation of the Hon. Secretary's report and the election of officers, these meetings will be recorded in the index as "Formal report only received."—Ed.]**

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# THE AGRICULTURAL BUREAU OF SOUTH AUSTRALIA.

**Every producer should be a member of the Agricultural Bureau. A postcard to the Department of Agriculture will bring information as to the name and address of the secretary of the nearest Branch.**

**If the nearest Branch is too far from the reader's home, the opportunity occurs to form a new one. Write to the department for fuller particulars concerning the work of this institution.**

## REPORTS OF BUREAU MEETINGS.

### UPPER-NORTH DISTRICT.

### (PETERSBURG AND NORTHWARD.)

WARCOWIE (Average annual rainfall, 12.16in.).

June 10th.—Present: nine members.

Upkeep of the Farming Plant.—Mr. W. J. Saunders contributed a paper on the upkeep of the farming plant, advocating that machinery and implements should be kept under cover, as protection against the weather, and painted every other year. Wheels should be painted every year. It was a mistake to use wire as a substitute for a bolt because it might cause a working in the joint. Every farmer should have a forge. Tireing should be done about the middle or end of summer, when the wood was thoroughly dry, as that tended to keep tires tight for a much longer period. Harness should be kept in thorough repair and oiled or greased twice a year. Mr. J. Feindler suggested the provision of a metal trough, made to suit the shape of the wheel, and it should be filled with oil covering the felloes and the ends of the spokes. The trough should be raised slightly off the ground, and a fire lighted under it to heat the oil. By turning the wheel occasionally and brushing the oil around the nave, the wood became thoroughly saturated with oil, which was an excellent preservative. Mr. G. Growden said that he had not found the oiling of wheels a success. He preferred a coat of good paint. Neatsfoot oil and mutton fat formed an excellent harness dressing, but if the oil were inferior in quality the leather would crack. Mr. T. Donnellan had observed good results from applying equal parts of mutton fat and Stockholm tar to harness. It gave an excellent finish, penetrated well, and did not rub off on the clothes. It was an effective dressing for riding saddles.

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WILLOWIE (Average annual rainfall, 11.90in.).

July 11th.—Present: eight members.

Tree Planting.—Beautifying farms and homesteads by planting ornamental trees suitable to the district was the theme of a paper by Mr. E. C. Foulis, who stated that the native trees of the district were becoming old and were fast deteriorating. There were no young trees to take their places, and substitutes should be found, not only to provide shelter for stock, but to maintain the supply of firewood and preserve the natural appearance of the country. Every vacant piece of land which could be spared should be planted with trees. In the driest of districts trees could be grown with success if the ground were thoroughly worked before being planted. It should be ploughed to a depth of 6in. several months before planting, and just before the trees were put in the soil should be again ploughed to a depth of 10in. or 12in., which would render it nice and mellow and save considerable labor in digging holes. After ploughing drains should be made to each tree in order that when rain fell it would be directed to the trees. The best time for planting was June or July, or even earlier if the trees were available.

If planting were deferred until August or September there was the danger of the caterpillars destroying the young plants before they became thoroughly rooted. The trees should not be planted too closely together—there should be a space of 18ft. or 20ft. between them. To produce a robust tree it was necessary that it should thrive well while young. Trees should not be planted near buildings or underground tanks, because the roots were liable to penetrate the stonework and do irreparable damage. The trees which had thriven best and were most suitable in that district were the pepper and sugar gum; but others which had done well were the tamarisk, pine and carob. The last-named was an exceptionally slow grower, but threw out very close, dense foliage which, when fully developed, afforded effective shelter for stock. Besides being adapted for ornamental hedges it produced a bean, which was useful as food for stock. Lucerne and olive trees should repay handsomely the trouble of planting.

Spare Time on the Farm.—On wet days, when the team was not able to work, said Mr. J. H. McCallum in a paper dealing with the methods in which a farmer might employ his spare time in winter and on wet days, the harness might be overhauled and given a coat of neatsfoot or some other good harness oil, but he preferred the former, especially if warmed before using. The repairing of chains should also receive attention. Wooden swingletrees were continually getting out of order, and it was a useful contrivance to make iron swingletrees out of old plough beams. That could be effected by putting three links in at the width required. The seed wheat bags should be patched—work which avoided delay at harvest time. Some farmers paid harvest wages for the mending of bags, when it might be done very much more cheaply beforehand. The bags should be stored in a mouse-proof bin, or they might be suspended on rails hanging from the roof of the barn, by wires passed through the neck of a bottle with a cork in it, which proved an effective block. The rail arrangement would be found convenient in overhauling the bags. The cleansing of stables and yards should be attended to as well as their drainage. A scoop would be found very useful in that work, and if the soil were taken out to ploughing depth in some places, great advantage might be gained. A few loads of stone would also be helpful. Plough and cultivator shares might be sharpened, and if the shares were chilled very hard their life would be almost doubled. There were always small matters which required attention in connection with the machinery. Mr. A. Gray said that the soil should be loosened very deeply for tree plantation, but should not be turned up with a mouldboard.

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CARRIETON, June 15th.—Mr. F. Kaerger read a paper on "Smut in Wheat," and the Chairman (Mr. W. T. Brown) read a paper on "Sheep on the Farm."

ORROROO, June 17th.—Mr. G. Graham read a paper entitled "Does it pay to market dirty or unsound wheat?" and pointed out that wheat price could not be expected for wheat and rubbish. Supplying inferior wheat would bring the home market down, and it involved also a loss in bags, because more bags were required if rubbish were marketed with the wheat. Inferior grain was frequently marketed because the crop was harvested before it was properly ripe, with the result that the inside of the grain became soddened, a condition inimical to the production of the highest class of flour. Smut also depreciated the wheat value.

## MIDDLE-NORTH DISTRICT.

### (PETERSBURG TO FARRELL'S FLAT.)

### MOUNT BRYAN EAST (Average annual rainfall, 16in.).

June 10th.—Present: five members.

Seeding and Fallow.—A paper on seeding and fallow was read by Mr. J. Doyle, who recommended seeding in April, even if the rain held off. Farmers having a large area to sow, if they waited for the rain, and it kept off until May, were hampered for several days by the heavy ground. He recommended pickling wheat three days before sowing, and then there would be no danger of malting, unless the rain was very late. Farmers who had sown before the rain had reaped 30bush.

per acre. He recommended Federation for grain and Yandilla King or Dart's imperial for hay. Fallowing should be started in June, and should be finished in August. The land so treated should then be cultivated in the spring, and if one cultivation did not kill the weeds it paid to go over it a second time. Farmers should fallow just as large an area as they could work and keep clean.

## NORTH BOOBOROWIE (Average annual rainfall, 16.35in.).

June 7th.—Present: seven members and eight visitors.

Breeding of Draught Horses.—Every farmer should breed his own stock, was the opinion expressed by Mr. E. J. Dunstan, in a paper on "The Breeding of Draught Stock," because, he said, with his intimate knowledge of the mares on his farm, he should be able, with reasonable judgment, to produce exactly the class of animal required. Shapeliness, size, good clean bone, muscle, and fine silky hair were some of the main points in a good animal, which should measure bigger than it looked, and weigh more than one would be inclined to think. The action was important, and the aim should be to produce a team even in pace, and the faster, in reason, the better. Intelligence and temper were important points which should be well studied. The most suitable horse for that district was the Clydesdale. Big-looking slab-sided mares were not desirable animals from which to breed, because they almost invariably produced foals with soft muscles and poor constitutions. It was also unwise to breed from vicious and sulky mares or stallions. Should the mare be weak in any characteristic, the stallion selected should be strong in that quality, so as to lessen the chance of the dam's weakness being reproduced in the progeny. In choosing a stallion it should be remembered that it paid to have the very best, even though the service fee were three or four times more than that of a lower class animal. The foals should be weaned when five months old. At that period it was able to feed out of a manger, and, if cared for, would do quite as well as when sucking the mare, on which it would be big enough to be a severe strain. Castration should take place in the spring, when the colt was two years old, and six months later it should be fit for work.

## PORT BROUGHTON (Average annual rainfall, 14.44in.).

May 19th.—Present: seven members.

Lamb Raising in Conjunction with Farming.—In providing sheep for the farm, observed Mr. T. E. Pattingale, in a paper on farming, the first essential was to ascertain the class of sheep best suited to the district. The next consideration was whether they were to be disposed of as mutton, kept for their wool yield, or for sale in the wool. The breed of ewe most su'table for that district was the Merino. Breeding for wool enabled the farmer to keep more sheep than if the sheep were fattened for the meat market. He had tried the Shropshire-Merino cross without much success. The wool yield of the Merino surpassed that of the Shropshire, his returns showing 5s. 5½d. per head for the former, as against 3s. 9d. per head for the latter, an advantage of 1s. 8½d. per head in favor of the Merino. As a rule only 30 per cent. of the lambs could be properly fattened, leaving 70 per cent. of the lambs on hand, a result which, if the lambs were crossbreds, was most undesirable. Mr. J. H. Fletcher preferred the pure Merino dam to the crossbred dam, though the latter produced a better lamb; but there was a great difficulty in maintaining the cross, and the wool returns were less favorable. He preferred the Shropshire-Merino cross for mutton production, because they were readily fattened and were not bad "fencers." Mr. C. E. Pattingale said that eight-wire fences were required for crossbred sheep.

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BEAUFORT, June 15th.—Discussion took place as to the best gate to use on a farm. Mr. J. Sampson preferred the iron gate in one piece, because the two-piece gates were troublesome to shut. Mr. W. W. Mugford said that as the implements now manufactured were so wide, it was necessary that the gates should be in two pieces, in order to accommodate them. Mr. A. Yard (Chairman) favored the double gate as the cheapest, and recommended that it should be swung to the straining post, which would ensure firmness. Mr. W. C. Veitch preferred the double gate, with each piece 7ft. wide. In reply to a question whether chaff with plenty of corn in it, or hay cut green without corn, was the better for a working horse, Mr. Sampson said that the horses preferred the feed with the corn in it.

BOOLEROO CENTRE, June 16th.—Mr. R. Mitchell, Chief Chemist of the Wallaroo and Mount Lyell Fertilisers, Limited, read a very interesting paper on "Superphosphate and its Relation to the Soil." Animated discussion followed, and Mr. Mitchell answered, in an illuminating manner, a number of questions.

CANOWIE BELT, July 15th.—In a paper dealing with fallowing, Mr. L. Kitschke said that the plough should be set so that every share would cut to an even depth, otherwise the ground was rendered ridgy. If the shares were set too wide, it made the ground lumpy and rough. The direction of the ploughing round the farm should be varied each year, to prevent the formation of ridges round the fence. He advised the burning of stubble, because the heat destroyed a certain amount of weeds and seeds. Fallow should be harrowed immediately after ploughing. If wet ground were ploughed, it became very hard in the spring. It was well to roll fallow before the cultivator was taken out. The cultivator should be worked crosswise to level ridges, and the depth should be from 3½in. to 4in. He preferred the disc cultivator, and would use it in September. A few sheep should be run on the fallow, but horses and cattle should not be turned into it in wet weather. Mr. Kirk advocated the use of harrows behind the cultivator.

PORT BROUGHTON, June 23rd.—Discussion took place on fallowing, the trend of opinion being in favor of early fallow.

## LOWER-NORTH DISTRICT.

### (ADELAIDE TO FARRELL'S FLAT.)

RIVERTON (Average annual rainfall, 20.48in.).

June 17th.—Present: 13 members and three visitors.

FALLOWING.—As a preface to a paper on fallowing, Mr. H. Mills advised farmers to have their harness well oiled or greased before commencing operations, in order to keep out the winter's rain. He expressed the opinion that fallowing should be commenced as soon as seeding had been finished whilst the horses were in good heart. Early fallowing was the best. He recommended ploughing to a depth of from 2in. to 4in., and considered 3in. a good depth, but it might be better to plough deeper every six or seven years. He was averse to ploughing in the weeds too deeply. It was inadvisable to plough the ground when it was too wet, especially red soil, as it became too hard to work up properly. Ploughing in black ground should be shallow in depth, otherwise the soil would become too loose for the seedbed, which should be compact. As much straw as possible should be ploughed in, as that provided organic matter for the following year's crop. It was, however, difficult to plough in straw, as the plough would not go through it, though occasionally the disc plough could be successfully utilised for that purpose. He preferred to put sheep on the fallow rather than cultivate it so much, as they helped to make it firmer for the ensuing crop. The end of August or September was a good time to harrow the fallow, but that should not be attempted if the ground were too wet, or cultivation would be much more difficult. After being well harrowed, the land should be cultivated, but not too deeply, or the seed bed would be injured for the following year. Sometimes it was necessary to use the cultivators twice, but the cultivator harrows might very often be used instead of the cultivator the second time, as they left the ground less open. Either the cultivator harrows or the scarifying harrows should be run over the ground just before harvest, to destroy stinkwort. After every rain, the light harrows should be put over the fallow, for it was of little use working it when the soil was too dry. Harrowing kept the moisture in the ground. With early rains the harrows should be used in order to start the weeds before seeding. He recommended summer fallowing where there was a large area of black soil which became sticky in the winter, but which could be ploughed very well in summer. The ploughing could be done soon after harvest, when the weather was not too hot to work the teams. The disc plough was splendid for summer work. With summer fallowing it was best to cultivate as soon after seeding as possible, when the ground was not too wet. Where the soil was loose the fallow should be cultivated with narrow shares, and the broad shares should be put over it afterwards, though in some circumstances it was well to use the narrow shares twice. Cultivator harrows were very useful to destroy weeds at the latter part of the year. Whilst it would be found most advantageous in a dry year to work with the cultivator only, to omit the ploughing for two years in succession was inadvisable. After harvest, a rib roller should be used to break the clods, and weeds would germinate immediately after rain instead of growing with the crop. The roller also packed the soil more firmly. The 5-furrow or 7-furrow plough was the best. It required eight horses to draw it. Mr. J. P. Schultz found that the land which he cultivated most gave the best returns. Mr. M. Dreckow said that it paid best to plough in stubble. He had ploughed stubble into clay land which usually set very hard, but now it could be ploughed at any time. The Hon. W. Hannaford was experimenting with the idea of ascertaining whether shallow cultivation would more effectively clear the land of weeds than deeper working.

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BLYTH, June 17th.—Mr. Spafford's article on "Takeall," from the June number of the *Journal of Agriculture*, was read by Mr. J. S. McEwin. Mr. Buzacott said that it would be difficult to burn stubble, as there was not sufficient growth on the patches where takeall had appeared. It would be better to cart straw there and burn it. Mr. A. L. McEwin said that he first used super. in 1898-9, putting six tons on 160 acres. He also sowed 160 acres without super. The result was that the manured crop averaged 19bush., and there was no takeall, whereas the crop which was not manured returned only 5bush. to the acre, and was infested with takeall. He had experienced no trouble from takeall since, except on a late fallow. Mr. W. Pratt had had considerable trouble with takeall, especially after a series of wet seasons. A proper seed bed was a check. Mr. W. O. Eime said that he noticed that takeall appeared after ploughing in deeply a heavy crop of cockspur. Deep ploughing and late fallowing encouraged it.

NANTAWARRA, June 15th.—Mr. S. Sleep tabled a sample of Rhodes grass raised in his garden. A small plot in a paddock was a failure owing to the disastrous season of 1914. The grass was a vigorous summer grower if provided with moisture, and would be a valuable fodder for stock in the absence of natural grasses. Members considered the grass unsuitable for the district, owing to the lack of summer moisture. Mr. T. Dixon, in the course of a general discussion, said that if ewes in lamb were turned into a paddock where stinkwort was in flower there was a danger of deaths resulting.

ROSENTHAL, July 11th.—Mr. G. Quinn, Government Horticultural Instructor, delivered an address on the principles underlying the pruning of fruit trees and vines.

SALISBURY, June 6th.—Mr. Goddard read a short paper on "Indigestion in Cattle and Sheep," touching on the various aspects of the complaint.

WATERVALE, June 12th.—DISCUSSION ON PLANTING CURRANT VINES.—Members favored early planting to secure the full benefit of winter rains. Mr. Burgess said it paid to plant well. He had obtained best results from putting a layer of earth over the roots and then sprinkling bonedust on top.

## YORKE PENINSULA DISTRICT.

### (TO BUTE.)

### BUTE (Average annual rainfall, 15.42in.).

June 13th.—Present: 17 members.

BREEDING STOCK ON THE FARM.—"Stock can be bred more cheaply than it can be purchased," stated Mr. J. L. Davis, in the outset of a paper, which recommended farmers to breed their own stock. For breeding horses he advised mating the selected stallion at first with all the mares on the farm, and then selecting those which produced the best and most useful horses for future breeding. To build up a good class of horse only the best should be kept. A horse should have a good top, and not be too heavy in the legs. It should have plenty of hair. The best time for foals to arrive was during the months of July, August, and September, so that they would obtain the advantage of green feed. Later foals missed the green feed, and did not thrive so well when weaned, besides, in many instances, becoming afflicted with blood worms. Those who kept only a few sheep for their own use should allow the ram to run with the flock all the year round. About 30 ewes would keep the average farm in meat. If the sheep were kept to produce income the rams should only be put in with the ewes, so that the lambs might be dropped in April and May, when the feed was green. Sheep should be frequently changed into fresh paddocks. Cows should be so managed that they would be coming in at intervals all through the year, for, if all came in at once they would probably all be dry about the same time. The bull should be frequently changed to avoid inbreeding. Properly managed the produce of one sow should keep the farm in bacon and provide pigs for sale.

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MOONTA (Average annual rainfall, 15.22in.).

July 8th.—Present: 14 members and one visitor.

Fodder Crops.—During the period from the falling of the first rains of the season until the end of July or beginning of August, observed Mr. A. B. Ferguson in a paper on "Fodder Corps," most farmers had a difficulty in providing sufficient feed for their stock, and it was then that the value of a good fodder crop was most appreciated. The most suitable crops in that district were oats and barley. Oats might not have the same feeding value when young as barley, but oats would not affect the wheat yield in the succeeding crop to the same extent as barley. If the oat crop grew to maturity there was fine feed value in the straw. Barley could not be surpassed for early growth and its quick fattening properties. It was easily cropped on stubble land, where, early in the season, it could be drilled in. Sorghum usually grew well, and came in as a good summer fodder, when other feeds were dying off.

DOWLINGVILLE, June 15th.—Discussion took place as to pickling wheat. Members generally favored turning wheat on the floor when pickling. The pickling should be done a sufficient length of time before sowing to enable the grain to become thoroughly dry before it was sown.

MOONTA, June 10th.—Mr. T. H. Hooper read a newspaper extract on "The A.B.C. of Rational Manuring." Mr. W. J. Brinkworth expressed the opinion that if guano super. and Thomas phosphate were drilled in the ground when fallowing, then the use of ordinary super. when seeding would be beneficial.

## WESTERN DISTRICT.

COORABIE (Average annual rainfall, 11in. to 12in.).

May 13th.—Present: six members.

Bush Buildings on the Farm.—The high cost of sawn timber and galvanized iron necessitated a return to straw and bush buildings, declared Mr. E. J. Stretton in a paper on the erection of bush buildings on the farm. He recommended that the site for the stables should be selected to the east of the homestead, which obviated the dust nuisance in driving stock to and from the paddocks. For bush buildings, red mallee or long mallee forks, not less than 7in. in circumference at the base, should be used. They should be set 3ft. in the ground, and the outer line of forks should stand 7ft. above the ground. The centre line should be 8ft. out of the ground, and they should be 8ft. apart each way for chaffsheds and 10ft. apart for stables, or 5ft. between each horse, and 10ft. between the centre and the outside. For the bearing rails, on the upright forks, he preferred red mallee, not less than 4in. in circumference, but the top row of rails from the centre to the outside forks should be 3in. in circumference. The fork should be outside the timbers, in order to prevent them slipping down. That would leave about 9in. of the butts overlapping the centre bearers. The top forks should be 12in. or 15in. apart. In many cases that was topped up again with brushwood, but he preferred to use netting stretched over the length of the roof, with about 3ft. of new stubble on top, which made a neat, light, almost waterproof roof. For the sides of the shed intermediate light uprights of mallee should be used and laced in with light "whipstick" ti-tree, as that class of brush did not sag in the same way as mallee, and had the advantage of packing closer and keeping out rain, dust and poultry. Such sheds should open towards the east in order that the rain and rough weather might beat upon the back. Light hurdle doors with netting over them, would keep the poultry away from the wheat and chaff in the shed. The centre forks for the stable should be selected with a spur on them, about 5ft. 6in. from the ground for convenience in hanging up winkers and collars. In that way, those articles would be in front of the horse, instead of at the rear, an arrangement which always involved the risk of being kicked. The chaff shed should be erected as close to the stable as possible, to save labor in carrying feed—no small consideration when 12 or 14 horses required to be fed four or five times in the 24 hours. It was well to build the chaffshed and stables on parallel lines, with sufficient room at one end (preferably the north) for the haystack. The implement shed could be constructed on a similar plan, though the outer uprights should be so placed as to meet the necessities of the machinery to be housed in it. The seed drill would occupy the widest span, and two drills might be run into one span by taking the poles out of the drill which was put in first. It was wise to enclose the wet weather side of the shed. At the end of the stable a small shed should be built for heavy harness, such as saddles and spiders. The risk of fire in such sheds could be lessened by the exercise of reasonable care at all times. Mr. C. T. Giles expressed the view that unless it were imperative to build at present it was better to wait until the price of iron fell. He preferred stone buildings with iron roofing. Brush roofs required fresh material every year to keep them weatherproof. Mr. D. Riddle favored a brush and straw roof, which was warmer in winter and cooler in summer than iron. He recommended cutting long stubble with the binder and thatching the roof with the sheaves. The general opinion of members was that bush sheds must not be made too wide, because of the insufficient pitch of the roof, owing to the difficulty in obtaining upright forks of the required length for the centre.

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## ELBOW HILL (Average annual rainfall, 11in. to 12in.).

June 10th.—Present: 11 members.

Farm Produce and Supplies.—Mr. R. S. Mills contributed a paper under the title "More Economical Methods of Buying and Selling the Wares of Producers." He suggested the formation of an association of primary producers with the object of eliminating the middleman and enabling the producer of one class of article to secure other articles direct from the producers thereof. A conference of representatives of the different Branches of the organisation would be in a position to study such questions as the economical handling of the products. He suggested that producers of wool should pay into a common fund 1d. for each lb. of wool selling at 6d. per lb. or over; that would in one season provide sufficient to build and equip a factory to turn out a finished article instead of the raw material. A good discussion followed, the majority of members agreeing that it was necessary for producers to organise for mutual protection.

## KOPPIO (Average annual rainfall, 22.40in.).

June 13th.—Present: six members.

Care of Lambing Ewes.—Dealing with the care of lambing ewes, Mr. J. Newell expressed the opinion that a suitable paddock, near the homestead, with a fair amount of feed on it (green if possible) should be set apart for them. It was doubtful if such feed could be produced early in the season, therefore it was better to set aside a small paddock with a fair amount of natural grass, and with the first good rain there would be strong feed ready. If there were many lambing ewes it was best to keep them in an adjoining paddock until they lambed, and then, as soon as the lambs were able to walk, they should be removed to the paddock provided with fair feed and plenty of good water. It would pay to collect the lambs as they were dropped, and hand feed the ewes for the first week in a small enclosure. Ewes to lamb should always be separated from dry sheep before the lambing commenced. It would pay those having 100 ewes to lamb to divide them into two lots, the first 50 to lamb in April and May, and the second in August and September, which would give a better percentage, and one high-class ram would be sufficient, which would be a saving. To ensure the lambing season being as short as possible, the rams should be in good condition before being put in with the ewes, and each ram should be restricted to 50 ewes. It was stated in the course of discussion that early lambs always did best.

## MILTALIE (Average annual rainfall, 14.55in.).

June 16th.—Present: 11 members and three visitors.

Water on the Farm.—On a new farm the first consideration should be the provision of a good water supply, declared Mr. T. J. P. McEachen, in a paper. It was well to have the homestead centrally situated on the farm, but regard should always be had for the situation of the water supply, in order to obviate, as far as possible, the necessity for carting water. Every farmer should have a good tank of water as a stand by. A large amount of water ran to waste every year, which if conserved would save a lot of water carting. A tank should be put down well and strong, and if possible should be on higher ground than the horse yard, so that the latter might be supplied by gravitation. If the yard were higher than the water supply, a pump should be used so that there was a constant supply. The trough in the horse yard should be fitted with a ball tap, in order that it might not run dry nor run over. Mr. W. E. Hier supported the suggestion that water should be laid on to the horse yard, as the supply should be abundant and the horses should never be stinted. Mr. W. G. Smith deplored the extent of the time and money wasted in carting water. Mr. J. S. Jacobs did not favor balltrap troughs. Mr. H. R. Jacobs (chairman) preferred dams to constructing tanks where the ground was unsuitable.

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## PENONG (Average annual rainfall, 11.93in.).

May 13th.—Present: eight members.

Seeding.—The Hon. Secretary (Mr. O. J. Murphy) contributed a paper as follows:—"The most important questions to be decided at seeding time are perhaps—(1) When to begin and when to finish sowing, (2) the procedure to be adopted, and (3) the kinds of crops to be grown and the order of sowing. No hard and fast rule can be laid down as to when sowing should be started, as the seasons vary considerably in regard to rainfall. Speaking generally, the period from the middle of April till the second or third week in June appeared to be the most suitable time to sow the crops. Reference to the rainfall records of our district, which are available for the last 24 years, show that a certain amount of risk is attached to sowing as early as March. The average rainfalls for January, February, and March are 36 points, 75 points, and 49 points respectively. It should be noted that the extraordinary fall of 6in. in February, 1913, accounts largely for the comparatively high figure for February—a figure which is not likely to be maintained. It is obvious that seed sown in March or earlier cannot be expected to germinate well, as a rule—the rainfall is not sufficiently high; and even if germination be good the rainfall of April, which has an average of but 85 points, combined with the fact that periods of hot weather are not uncommon throughout March and April, do not ensure a vigorous growth. Further reference to the rainfall records show that May, June, July, and August have average falls of over 1¼in. Consequently the risks attending March sowing are not nearly so great in April, especially in the latter part of April. It may be stated with accuracy that seed sown in the latter part of April will, with very few exceptions, meet with conditions favorable to its growth. Early wheats, such as Gluyas, under normal conditions require about 16 weeks from the time of germination to ripen. Although the average rainfall during September is considerably lower than that of the four preceding months, it is fairly reliable. In only four out of 24 years has the rainfall for September been under ½in., so that September may be regarded as a favorable month. Consequently, early wheats sown in June, when they may reasonably be expected to germinate immediately, will have 13 or 14 weeks of good growing weather. The rainfall of October is on an average little less than that of September; but the records show that in eight out of 24 years less than ½in. has fallen in October. The comparatively high average for October has been probably influenced by thunderstorms, and, therefore, is not a reliable month. Also hot winds are likely to be experienced in October. It is well, therefore, to have the last wheats sown before the end of June. The procedure to be adopted will depend on the condition of the soil, and especially on the preparations. If new ground alone has to be dealt with, that is to say, land which is free of rubbish and being cropped for the first, second, or third time, the crop results will depend very largely on the character of the season; but on older farms the problems are more complex. Grass land, more or less infested with weeds and rubbish, has to be dealt with, and unless some preparation in the way of fallowing has been taken, no large area of this ground can be cropped with success. I do not think sufficient importance is attached to fallowing. Apart from the better results obtainable, fallow has a special value in that it is ploughed at a time when there is not the same need to hurry as at seeding time. The plough can be set with the idea of removing stumps, and the stumps can be removed immediately. Land fallowed as early as July or August may need cultivating in September or October. A small flock of sheep will keep down any rubbish which may spring up during the summer months. Mustard, cockspur and thistle are readily eaten by sheep, and these are probably the chief enemies of our growing crops. I consider a good fallowing system far preferable to ploughing at seeding time when as few stumps as possible are pulled out by the plough, and these are too frequently left to obstruct the drill. Moreover, I believe that fallow will give better results than green ploughed ground, and especially so in the drier years. In 1914 I had an average of 4bush. of wheat from 220 acres fallow, whereas the land ploughed at seeding time failed in some cases to return seed, and in no case was half as good as the fallow. Green ploughed ground may produce good clean crops in a favorable season, but if the opening of the season is late, as in the present year, the farmer who is depending on green ploughed ground must either curtail the area sown or finish sowing late in the year. I consider the best procedure is to sow new ground first, then fallow, preferably after rain, and finally green ploughed ground. If rain has fallen before fallow is drilled it is advisable to use the harrows. I have found harrows very efficient in destroying mustard, cockspur, and grass if used while the plants are in the first stage of their growth. Practically the whole area placed under crop each year in our district is sown to wheat. Small areas of oats are grown mainly to provide horse feed, and still smaller areas of barley are grown. I believe that better results could be obtained if oats and barley were more extensively grown. The soil is well suited to barley growing. During the past three seasons I have obtained double the average of wheat crops from crops of malting and feed barley. Oaten and barley stubbles are more valuable as stock feed than wheat stubble; and it has been frequently pointed out that heavier wheat yields are obtainable by varying the crops than by adhering to the same cereal throughout. In regard to the order of sowing various wheats the practice of sowing large areas to early wheats at the beginning of seeding is inadvisable. In the event of a dry winter such wheats will run to head possibly as early as in July, whereas later varieties will stool and hold out against dry spells. Small areas of early wheats may be sown for hay with advantage; but the bulk of early wheats should be sown in May or June. Wheats such as Gluyas, which have a tendency to "go down" are less likely to lodge if sown in June rather than in April. Some difference of opinion exists as to the profitableness of applying artificial manures. It is to be regretted that apparently no experiments of scientific value have been undertaken to test the value of applying manures to our soil. The use of superphosphate is by no means regular. There is an opportunity here for this Branch to conduct experiments to prove conclusively whether the application of superphosphate pays. There is, however, no difference of opinion as to the effect of superphosphate on the growth of mustard and cockspur. The effect on mustard is very marked. This leads one to the supposition that if the mustard and cockspur were eliminated the superphosphate would have a good effect on the wheat crop. It would also seem to point to the fact that it may not pay to use superphosphate on soil which has not been freed of rubbish." Members agreed with most of points in paper. Mr. W. Place strongly advocated the use of superphosphate. He did not think barley growing would be profitable to any great extent on account of the uncertainty of the market. Mr. J. Stiggants also held that view; and considered feed barley to be too heating to be used as horse feed. Mr. J. C. Stiggants had found Cape oats a good variety to be grown in that district, both for hay and grain. He advocated the use of superphosphate, and considered an application of 30lbs. to 40lbs. gave best results. Mr. J. Oats had made a practice of beginning seeding in the last week in March, and had seldom experienced adverse results. He considered it wiser to sow in the last week in March rather than as late as the last week in June.

## ROBERTS AND VERRAN.

July 7th.—Present: seven members and one visitor.

**Farm Management.**—When harvesting machinery had been finished with for the season it should be thoroughly cleaned, overhauled, worn parts repaired, and placed in a shed for protection from the weather, advised Mr. W. McCullum, in a paper on "Farm Management." A coat of paint would assist in the preservation of the implements and tend to prevent the nuts becoming loose. Only the best and most prolific varieties of wheat should be used. Fallowing should be commenced immediately after seeding. He preferred the mould board steel-plate plough, which was more effective in removing stumps than the disc implement. Fallow lands should be well harrowed, as the operation assisted in killing weeds and retaining moisture. The fallow could be kept clean with sheep, which would also provide a meat supply for the household. Pigs and poultry should be kept, because they could be fed upon the refuse, and thus become a source of profit. An indispensable adjunct of a farm was a blacksmith's outfit. That, combined with a little trade skill, would prove a great convenience in making repairs, besides effecting a considerable saving of time and money. Harness should be kept dry, and should be given at least two applications yearly of a mixture of equal parts of neatsfoot oil, resin, and tallow. Horses should be groomed every morning. During the period between seeding and harvest fences should be repaired, and stumps and stones removed from the fallowed land. Mr. F. Masters favored the disc plough if the land had much rubbish or shoots on it. Equal parts of resin and tallow made too stiff a dressing for harness. Mr. F. Imhoff said that the disc plough did not pull out the stumps, and when it became worn it did not cut any more shoots than the share plough. Mr. W. Sharman declared that the disc plough pulled out enough stumps for one man to deal with, and was best to treat shoots or rubbish with. Mr. A. T. Cowley considered that pigs and poultry should find a place on the farm. Machinery, when finished with, should be thoroughly overhauled. The class of plough to be used depended upon the nature of the land. If the surface of land ploughed with a disc plough were removed the bed would be found to be ridged, whereas the share plough produced almost a flat bed.

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## WARROW.

June 17th.—Present: 12 members.

**Growing Kale.**—Sowing should take place in the winter months, not later than August, declared Mr. M. Kennett, in a paper on "Kale Growing," in order that the plant might develop and become well rooted before the summer months dried up the moisture. The plants needed moisture, and, after summer showers, made great headway. Kale could be sown with wheat, or any cereal crop, or could be grown in a bed, in the same way as cabbages, and then transplanted into rows about 3ft. apart. Kale belonged to the cabbage family, and was a gross feeder, therefore a plentiful dressing of manure was required. Seed sown in a paddock should be mixed with super., at the rate of 1lb. per acre. It should not be sown deeply in the soil. For the first year the leaves should be stripped, as grazing would probably result in the destruction of the plants. Kale, which was useful for all stock, generally lasted three or four years, and would carry a large number of stock in that period, a condition which should ensure a good cereal crop afterwards.

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## YEELANNA.

July 15th.—Present: 15 members.

**Feeding Value of Oats.**—In that district, remarked Mr. H. Solly, in a paper in which he discussed the feeding value of oats, the only practicable change crop was oats, because of the ravages of takeall, which did not affect oats to any great extent. The high relative value of the oat for general feeding was the outcome of its palatable qualities and the equilibrium of its nutrients, which gave it a fine balance as a food and the amount of hull and kernel provided a proper amount of concentration, and was not too much for safe feeding. For milch cows oats were at least as valuable, pound for pound, as bran. If fed dry, oats were not suitable to the digestive economy of the pig, but if soaked or boiled, they became more palatable and more useful, and pigs could be kept in fair condition on a diet of oats alone. No substitute had been found for oats as a food for horses, either in preserving health or maintaining mettle and staying power. The feeding of oats to sheep from March to mid-winter, when the paddocks were usually bare, made it possible to maintain a larger and more certain flock, with the advantage of being able to fatten the surplus according to requirements, as the sole grain ration from ¾lb. to 1lb. of oats per day would keep sheep in health and good condition. Troughs or shallow boxes should be provided to keep the feed in. A suitable trough could be constructed of two pieces of oregon, 2ft. 9in. by ¾in., 12ft. in length. They should be nailed so as to form an L angle, and two pieces of oregon, 7in. by 1½in., 2ft. in length, with V cuts in them, would hold the trough in position and provide feeding accommodation for 25 sheep. In the course of discussion, it was agreed that in that district sheep could be kept in good condition with little or no feed in the paddocks on an allowance of 1lb. of oats per day.

CARROW, June 15th.—ANNUAL MEETING.—Mr. F. J. Anear read extracts from Messrs. Metcalf & Co.'s report on the bulk handling of wheat.

COORABIE, June 10th.—Mr. Riddle reported having lost a milch cow and a heifer (shortly to calve). He described the symptoms and the result of the post-mortem. He also produced some dry caked matter, a sample of the contents of the tightly-packed bible of the cow. Discussion took place as to the possibilities of it being a case of dry bible or phosphorous poisoning, and it was resolved to send the matter produced to the Government Veterinary Lecturer for report.

KOONIBBA, June 15th.—A paper on "Wet and Dry Farming" was read by Mr. A. Moody. In the discussion which ensued, Mr. E. E. Lutz said that after ploughing his land twice and harrowing it five times to eradicate mustard, the weed came up as strongly as ever. Members agreed that wheat should always be sown before the rains, because the seed required all the moisture possible. Wheat sown early in June seldom did well. It was also recognised that scientific farming was essential, and that it was better to cultivate 300 acres according to proper methods than to crop 600 acres in a slipshod fashion.

MOUNT HOPE, June 30th.—Discussing the question of pig raising, Mr. T. Speed said he favored the Mid York breed, because they were quick growers. It was best to commence with a few sows in a wire netted paddock, which should be sown with barley, because grazing was the cheapest and best method of raising pigs. When the barley had ripened the pigs should be fed on grain to "top them up" for the market. Mr. J. Winstanley said that it would be necessary to put iron rings through the pigs' noses or the wire netting would not resist them.

SALT CREEK, June 17th.—A paper was read by Mr. B. Braunack on bulk handling of wheat. In reply to a question, Mr. Venning was informed that berseem seed should be sown in March or April.

## EASTERN DISTRICT.

### (EAST OF MOUNT LOFTY RANGES.)

### COONALPYN (Average annual rainfall, 17.49in.).

July 14th.—Present: nine members and two visitors.

DISC AND SHARE PLOUGHS IN MALLEE LAND.—Discussing the merits of the disc and share ploughs, in a paper on that subject, Mr. J. F. Pitman stated that for clearing the land of stumps the share plough was the better, as it pulled out more stumps, and cut off equally as many shoots as the disc. If it were only required to cultivate the land and not pull out the stumps, the disc plough would answer all requirements, but even then he preferred a skim share plough, as there was heavy wear on the sockets of the disc plough, and it required a large amount of oil. The implement used should not be large if the land were stumpy and uneven. With an 8-disc plough the wheels were so far apart that they were frequently on the high patches when the discs were over the low patches, and *vice versa*, conditions which caused the plough to be drawing heavily one moment and running lightly the next, and producing a jarring effect on the horses. With a smaller implement, the wheels being closer together, seemed to control the depth of ploughing better. In wet weather he found that the 6-disc implement gave considerable side draught, especially if the surface were at all slippery. An 8-disc plough and a 4-furrow share plough were quite large enough for stumpy country. Another disadvantage with large implements was that the frequent contact with the stumps soon strained the frame badly, and once that happened it was impossible to get the plough in good working order again. Mr. Hill pointed out the great difference between disc ploughs and disc cultivators. He preferred the disc plough, because it would work where a share plough could not be used. In land which had been neglected for six years he had cut 90 per cent. of the mallee shoots with a disc plough, but he would not say that it pulled out more stumps than the share plough. Mr. Cronin considered that share ploughing was cheaper because there was less wear. In stump land the excessive side draught of the disc plough caused imperfect work. In a plough weight did not always mean strength. Members generally were of opinion that a 4-furrow plough was a wide enough implement to begin with among stumps.

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## FORSTER (Average annual rainfall, 11in. to 12in.).

June 17th.—Present: five members.

Value of Fallow.—In a paper dealing with "Improved Methods in Farming" Mr. T. Searle combated the idea that intense culture was only suited to heavy soils in wet districts, and he urged that the more land in dry districts was worked the better were the results obtained. Heavy cultivation kept the land clean, and tended to conserve the moisture, with the result that the crops were better fitted to resist adverse weather conditions. In a district with the rainfall which Forster received it would pay to grow wheat only on fallowed land. A farmer with 1,000 acres would have a better chance of making good by sowing 300 acres and fallowing 300 acres every year, than if he put in 800 or 900 acres on stubble or grass land. With fallow land the seed could be sown more quickly, and it was less strain on the horses, as the ploughing would be done in the winter when the ground was in a better condition for ploughing, and there was not so much demand on the farmer's time. He preferred early fallowing with repeated harrowing and good cultivation in the spring to kill weeds and conserve moisture. The selection of seed was important, and the farmer should grow the variety best suited to his land and the district. For early sowing he preferred Purple Straw and Marshall's No. 3, but for late sowing he recommended Gluyas. For hay Yandilla King was a good stooler, with a good flag, and was a fairly high grower.

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## GERANIUM (Average annual rainfall, 16in. to 17in.).

June 17th.—Present: 10 members.

Blacksmithing on the Farm.—Mr. W. J. Mitchell contributed a paper with this title. He referred to the saving of time and money that could be effected by the farmer mending hames and hooks, making bolts, &c., and gave detailed hints for carrying out minor repairs. He had found the "blower" more satisfactory than the bellows for keeping up the forge fire. The procedure adopted in brazing, tempering, and sharpening shares was described, and the process of welding was explained.

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## HALIDON.

July 12th.—Present: 16 members and three visitors.

Colt Breaking.—A colt's education should commence, observed Mr. J. W. L. Ritchie, in a paper on colt breaking, when he is about one month old. It was a mistake to delay the breaking-in operations until the colt was two or three years old, because, at that age, it commenced to have ideas of its own, was more cunning and considerably stronger, conditions which frequently involved the adoption of harsh measures, and the danger of damaging the colt. At first it was best to tie the dam in a stall, and then there would be no difficulty in catching the foal. Farm-bred colts were seldom frightened, and when they understood that they were not to be hurt, they would display a liking for being caught and handled. A leather halter should be put on, with a broad leather strap around the neck, and a "tie up" rope attached. The rope should be run through the ring under the colt's chin, and then he should be gently, but firmly, pulled first to one side and then to the other. The colt and his dam should be then taken for a short walk. Those operations should be repeated for a few days, and on odd occasions afterwards. When six months old, the colt should be weaned, and he might then be tied up. A broad leather strap around the neck should be used for that purpose, but the rope should not be put through the halter ring. In the beginning the colt should be tied up short in a place where it was not possible for him to turn round. It was good training to lead him from his stall to water; but the colt should not be kept tied up longer than two hours at a time. If well grown at the age of two years it might be mouthed and bitted and put to light work; but if weedy, that operation should be postponed for another year. In mouthing a colt it was well to use a thick snaffle with large rings, and it should be attached to the halter with a small bit snap on each side. An hour or two should be allowed for the colt to become accustomed to the bit. In the absence of proper mouthing tackle, a strong surcingle, with a ring or buckle on each side, might be used. Side reins could then be put on, but only pulled up sufficiently to bring the colt's head to the near side. After running around for an hour or so the reins should be changed to the off side, and then gradually tightened, until the colt was compelled to walk in a circle. That operation might be repeated for a few hours for two or three days, when the reins might be put on each side, with both reins of equal length. He should be buckled up fairly short and kept moving for a while. When well mouthed, the colt should be led with a rein to the bit, and brought round first on the near and then on the off side. Next the colt should be taught to back, and the word "back" should be used at the same time as the horse was pushed rearward with a coupling on each side of the bit. In teaching it to back it was a mistake to jerk the colt's mouth or strike it. A simple method of teaching the colt to hold up its feet was to buckle a strong hame strap, with strong leather reins attached to the fetlock. The free end of the reins should be carried over the colt's back and under the girth. The foot should then be lifted and the slack taken up, by which means the foot could be kept off the ground, in spite of the animal's endeavors to put it down. That operation should be repeated with each foot, until the animal would permit its foot to be lifted by hand without the aid of a strap. At that stage the colt might be put to light work in a strong light spring dray. Before being put in the dray the colt should be led around it, with his harness on and permitted to have a good look at the dray. He could be either backed into the shafts or be tied up and the dray drawn up to him, the latter course being generally preferred. A good kicking rope should be put over the colt's rump and attached to the shafts. The colt should not be tired the first day, and before an attempt was made to take him out of the shafts he should be tied to a stout rail. If he proved too free in the team he should be tied back. Colts should never be lassoed, they should always be approached on the near side, and they should never be shouted at, but spoken to gently and firmly. Mr. C. H. Russell said that he preferred attaching the colt to a light log to placing it in the shafts of a dray. The Chairman suggested that, in teaching a colt to lead, a rope should be run along one side of the animal around the thighs and along the other side, and, when the horse refused to lead, the rope should be gently pulled in front. The rope should be supported by straps over the horse's back. Mr. H. L. Harris suggested using a rope with a ring in the end, instead of the usual slipnot, in catching fractious horses.

## MONARTO SOUTH (Average annual rainfall, 14in. to 15in.).

July 15th.—Present: 23 members and four visitors.

FERN COUNTRY.—In a short paper on "Fern Country" Mr. B. Bormann recommended that first of all the ferns should be well burned. Then the land should be well fallowed, because the roots which were turned up would die. In summer the fallow should be well worked to destroy as many of the remaining roots as possible. Peas should be sown in season, and, if the peas were raked up, the ferns which did grow would not give much trouble. If wheat were grown, the ferns would be troublesome when stripping. After the peas had been taken up sheep should be put on the land to pick up all shelled peas. The land should then be ploughed again to prevent the ferns making a fresh start. This should be kept on for several years. Peas would grow on the same land year after year, but wheat seldom did well in successive crops.

## MURRAY BRIDGE.

July 18th.

**Pruning Demonstration.**—Mr. H. J. Darwent gave a demonstration in fruit tree pruning.

**Insect Pests and Fungus Diseases.**—The following paper was read by Mr. Darwent at the evening meeting:—"Fruitgrowers in South Australia on the whole have rather an intimate acquaintance with the subject of this paper, but many who are just starting out to plant orchards and vineyards have little or no knowledge of the havoc wrought by both insects and fungi, and to anyone taking up such an occupation it is essential that greater knowledge of the depredations caused by them should be obtained. The fruit industry both for fresh and dried fruits has ample room for expansion, and with the natural advantages existing, as they do on this fine river, it should be our aim to keep the new settlements as free as possible from pests of either kind. As an example of the need of watchfulness there is the enemy of the vinegrower, *Phylloxera vastatrix*, or grape-vine louse. This pest has caused enormous damage to the vine-growing industry in some of the other States, and it is only by strict attention by those in authority, and the co-operation of the people as a whole, that we may hope to keep our State free from it. We have laws and regulations preventing the importation of trees and plants except under certain conditions, but like any other law, if a person deliberately lays himself out to defeat the intention of the Legislature, he may do so, and so I would impress on you the importance of the carrying out of the law dealing with these importations in the interest of a large and growing industry. When we consider the question of destroying an insect it is necessary that we should know its life history, so that we may be able to attack it with the greatest prospect of success. In insects we generally find four distinct stages—firstly, the eggs; secondly, the larvæ; thirdly, the chrysalis or pupa; and fourthly, the perfect insect. Some, such as aphides, have no properly defined pupal stage as in the case of moths, where the pupa is quiescent and does not require food. In the case of aphides the insect is active in the pupal stage and feeds throughout it, and so they are injurious all their lives. In the other cases there is only a certain time when damage is done, that is, the larval or caterpillar stage. Insects may be divided into groups, according to their habits, as follows:—Chewing insects exposed from hatching until full grown; chewing insects exposed for only short periods of their life; chewing insects which eat the leaves, bark, and buds of plants; sucking insects which fasten themselves to the plants; sucking insects which fly from plant to plant; maggots which live under the skin of the fruit; mites which live on the leaves of trees; borers which destroy trees by boring into the trunk and limbs. Seeing that we have so many insects of different habits with which to contend, it is easy to see that there can be no great cure-all; but each class must be attacked at the proper time, and with suitable remedies and appliances. For chewing insects exposed from hatching until full grown we must use either a poison by placing it on the food which they eat, or a spray which kills by contact. An example of such an insect is the cherry and pear slug (*Selandria cerasi*). This slug is found on the leaves of the cherry, pear, plum, peach, and quince tree. It is black and slimy, and about half an inch long. It feeds on the upper side of the leaf, leaving nothing but a skeleton. When full grown it sheds its coat and appears buff-colored and dry, and goes into the ground, where it spins a cocoon covered with earth. Here it stops until the following summer. Chewing insects exposed only for short periods must be killed by using a poison by placing it on the food which the insect eats. The codlin moth (*Carpocapsa pomonella*) is an insect of this class. Arsenate of lead has been found to be the most successful remedy, the strength used being 1lb. of arsenate of lead to 20galls. of water. There are usually three broods of this insect in a season, so that it is necessary to apply several sprayings in order that the fruit may be coated ready for the advent of the larvæ. Bandages may also be placed on the stems of the trees to act as traps for the larvæ when they leave the fruit, but they must be examined every seventh day, and all caterpillars found under them destroyed. Another chewing insect is the curculio beetle (*Otiorrhynchus cribricollis*). A great deal of damage is done by this insect in some parts of the State. It feeds on the leaves, bark, and buds of the trees, devouring the whole. While it is obvious that arsenate of lead will also kill this insect, it is useless to have a mixture of a weaker strength than 1lb. of arsenate to 6galls. of water. There are also other means of trapping the beetles. Bands of sheepskin with the woolly side out and combed may be tacked round the tree stem. The insects cannot fly, and in trying to get over the wool their legs become entangled, and they die. Another method is the placing of zinc or lead troughs, in which is placed oil, round and close to the stems of the trees on the ground, which must be finely worked so that no insect is able to get under the troughs. Success has also been achieved by the use of fine drift sand, placing it round the tree stems, and heaping it up in a cone-shape. The insect tries to climb to the tree and the sand gives way, burying the insect beneath it. Roses and other garden plants are often attacked by this pest. It secretes itself in the ground during the day, and attacks the plants at night. Sucking insects, such as scale and aphides, which fasten themselves to the plants must be dealt with either by sprays which kill by contact or by suffocation by fumigating the trees under gas-tight covers. In the case of deciduous trees the former method is by far the better on account of its being more easy to carry out when the trees are dormant, and because it does not entail the same expense as fumigation. Red oil emulsion or crude petroleum emulsion is recommended for winter use only. If it is found necessary to spray when the foliage is on the trees, then the best remedies are kerosene emulsion, resin wash, or lime-sulphur mixture. Evergreen trees affected by scale insects are more satisfactorily dealt with by fumigation, as it is almost impossible to thoroughly wet every leaf and twig of dense trees. In regard to sucking insects which fly from plant to plant, such as the Rutherglen bug (*Nysius vinitor*), there are no very effective remedies. The best known is benzole emulsion. The insects have an aversion to the smell, but as this soon goes off it would mean that continual spraying would be necessary. Fortunately, those insects of this class which do most damage to fruit only appear at long intervals as the seasons suit them, and hence the damage done by them is slight on the whole. Maggot pests, such as fruit flies, which live beneath the skin of the fruits, are perhaps the most difficult to deal with. The eggs are laid under the skin of the fruit by the female fly, which punctures it by means of a very sharp needle-like organ called the ovipositor, thus making it the most difficult to attack. It is uncertain how long the incubation of the eggs take, but there are several broods during a year. Nothing is more successful in fighting this pest than the picking of the infested fruits from the trees, and all fruit from the ground, boiling or burning it daily. As this insect has not yet taken up its abode in this State, there is no doubt but that prevention of its introduction should concern us first, for once it is established it would mean ruin to much of the fruit industry in a country like this where practically every home has a fruit garden. It is a matter concerning not only the commercial fruitgrower, but the whole community. The Bryobia mite (*Bryobia pratensis*), commonly called red spider, has caused a considerable amount of loss or damage during the last few years, due no doubt to the dry seasons experienced. When trees are attacked by this pest the leaves assume a sickly, speckled appearance, the green color giving place to a greyish-white, caused by the feeding of the insects on the leaves, which fall much sooner than they otherwise would. The leaves are thereby prevented from fulfilling their proper functions, and the tree suffers. In winter the eggs of the mite can be found on the underside of the limbs in any crevice or shelter that offers. They are of a bright red color, and are sometimes very numerous. Red oil emulsion or crude petroleum emulsion are excellent remedies to use against the eggs in winter, care being taken to coat every part of the tree thoroughly, especially the lower sides of the limbs. These remedies cannot be used when the foliage is on the trees. That which has been found to be most successful at this time is lime-sulphur mixture, but care must be taken to avoid spraying during hot weather or the result will be disastrous to the trees. One and a half gallons of this mixture to 100galls. of soft water has been very effectively used against this mite. Being also a splendid fungicide, it serves a two-fold purpose, and for this reason is rapidly growing in favor. Boring caterpillars are to be found in some parts of our fruitgrowing areas. They are found in the limbs and trunks of the trees, the holes being noticed by the accumulation of burrowings on the trees. The only effective remedy is to clean away the rubbish from the holes and insert small pieces of cottonwool which has been saturated with carbon bi-sulphide or benzine, and then plug up the hole instantly with moist clay. In regard to all the insect pests mentioned, if success is to be attained, it is imperative that they should be attacked at the right time with proper appliances, and the work done thoroughly with proved remedies. The thinning out of the trees by pruning is a very necessary assistance, especially to spraying when the trees are in leaf, as it makes it much easier to wet every part of the trees thoroughly. In addition to insect pests there are fungoid diseases with which to contend. In a climate such as is experienced at Murray Bridge they are not likely to be so troublesome as in some parts of the State, notably the Mount Lofty Ranges. But while they may not show up to any great extent, they are often present, working insidiously, as it were, all the time sucking at the vitality of the tree. 'Prevention is better than cure, and that proverb is never better exemplified than in the dealing with fungoid diseases. A fungus is a plant, but it produces no flowers nor the green coloring matter seen in the leaves of other plants. It forms seeds, known as spores, and roots, known as mycelium. These roots make their way down into the wood, and live on the tissues at the expense of the plant, thereby seriously affecting, if not destroying it. This renders it practically impossible to apply any remedy when once the plant is attacked, unless we can remove the part attacked. The mycelium send out branches, each of which bear a receptacle containing many spores, known as conidiaspores, the masses of these producing what is familiar as mildew or mould. These conidiaspores are distributed over the plant in moisture, and the same process is gone through again. It is essential that the fungicides used to prevent the spread of the fungi be applied at the times which experience has shown us are right. Different fungoid diseases require treatment at different times. The gumming disease of the almond and peach (*Clasterosporium*) is one that will be familiar with growers of these fruits. If the trees are examined closely in autumn many of the buds on the previous season's growth will be found to be covered with a thin film of gum. If the buds be examined closely it will be seen that they are dead. Each year this goes on unless the trees are sprayed, and they become quite bare except for the last season's growth. It has been found by Professor Smith, of California, that the spraying of trees affected by this disease must be done as soon as the leaves fall in autumn. Another spraying when the color of the blossom is showing in spring would be beneficial, and it would also act as a preventive of peach leaf curl (*Exoascus deformans*). The spray to be used in each case would be Bordeaux mixture. The shothole and scab of the apricot (*Clasterosporium*) is a disease which causes disfiguration of the fruit as well as damage to the leaves and tree as a whole. The appearance of small dark round patches on the leaves, which eventually fall out, is the first notice of its presence. Later the fruit assumes a scabby appearance, which reduces the value of it, and destroys it for drying purposes. Bordeaux mixture applied in spring when the color of the blossom is showing is the most effective remedy. Black spot of the apple and pear (*Fusicladiums*) are among the most prevalent fungoid diseases we find in this State, and are well known. They attack the leaves, twigs, and fruit, doing enormous damage in some of the wetter parts, such as the Mount Lofty Ranges. Bordeaux mixture applied when the color of the blossoms is just showing and repeated after the fruits form has been very effective. Lime-sulphur mixture has also been used successfully, and is favored by growers because it is also an insecticide. There is also less danger of the fruit becoming russety when spraying is done with the foliage on the trees. Oidium or mildew of the grapevine (*Oidium tuckerii*) often attacks the vines, and can be checked by dusting flowers of sulphur over the vines just after the first leaves appear, and again when the vines are in bloom. A quick method of doing this in a vineyard is performed by a man on horseback, the sulphur being carried in a sugar bag, and as the horse walks along the row the bag is shaken over the vines. It is necessary that a still morning preceding a bright sunny day should be selected for this operation so that the warmth will make the sulphur effective. Black spot or anthracnose (*Spaceloma*) is another fungoid disease which affects the vine. The vines should be pruned and the prunings burnt. Then any old bark should be removed, and the limbs, spurs, and rods swabbed with a solution made as follows:—Pour half a pint of sulphuric acid over 50lbs. of sulphate of iron, and then dissolve the iron crystals in 10galls. of boiling water. It is necessary that a wooden vessel should be used, and that the clothing and hands be protected. One often hears the expression 'near enough' used by gardeners in regard to the preparation of spray washes. The various formulæ distributed by the Department of Agriculture are the result of years of experiment, and I would urge upon growers the necessity for observing exactness in preparing them, so that the best results may be obtained.''

## PARRAKIE (Average annual rainfall, 16in. to 17in.).

June 10th.—Present: 11 members and three visitors.

FALLOWING.—In an interesting paper on the subject of fallowing Mr. F. C. Heinzel recommended starting as soon as possible after seeding, July and August being the two best months. Generally speaking, sandy soil should be worked to a depth of not more than 3in., and clay flats about 4in. From year to year clay flats might be worked somewhat deeper, but care should be taken not to turn up too much clay at one time. The ploughing should cut an 8in. furrow, and the soil should be well turned to bury the weeds and rubbish. A share plough was superior to a disk for turning the soil and clearing out stumps. After ploughing the land should be harrowed crosswise before it set hard. The harrows, in addition to levelling the ground disturbed the stumps and facilitated picking. Weeds should be destroyed by cultivation in the early spring. The clay flats should be harrowed again, but not the sand, as the latter, if left rough, was less likely to drift. In the ensuing discussion, members agreed that sandy soil should be worked lightly and then left. The too frequent use of harrows in sand encouraged drift. The Chairman recommended ploughing to a fair depth in heavier soils, and thought sandy soils should be worked as little as possible. One harrowing was sufficient for fallow. He would use the cultivator more, and see that the harrows followed the drill. In a discussion on the most suitable wheats for the district, Red Russian, Yandilla King, and Gluyas were mentioned.

BARLEY.—Mr. J. G. Temby thought every farmer should put in 50 acres of barley, preferably malting. In the drought year his wheat return was nil, but the barley yielded 3bush. It provided good early green feed, and was a fast grower. The splendid stubble barley straw provided for burning, was a great help in new mallee districts.

## WYNARKA.

June 17th.—Present: 11 members.

IMPROVEMENTS IN FARM STOCK.—There was necessity for the improvement of all classes of farm stock, remarked Mr. W. Richardson in a paper on that subject; but he emphasised the importance of giving more attention to the character of horses produced and maintained on the farm. On the majority of farms horses were bred merely for the performance of the necessary work. With a better grade of foundation stock, however, and more attention to the selection of stallions, but without going further in the direction of breeding than the usual supply of farm horses justified, stock could be produced which would handsomely increase the farm revenue. There was a great demand for good horses, and it was so diversified in character and so wide in extent that production practically could not be overdone. There was a ready sale for every good horse, and, therefore, there need be no restriction as to type, and each person could exercise his own preference. Whatever the type selected, the aim should be to breed for strength and stamina, with a fair measure of style and a movement and disposition suited to the purpose to which the stock was to be devoted. Nondescript stallions, without style or character, should be avoided. The best mare the farmer could afford to possess should be mated with the best stallion available, keeping in view always the general qualities, size, strong bone, heavy muscle, good appearance, soundness of parts, and evenness of gait of the animal selected. Cheap low-bred country stallions should be rigorously avoided, also horses of unfashionable colors and those which entailed upon their progeny white faces and three or four white feet, a class of stock which was not popular. A colt from a highly-bred mare could be raised just as cheaply as that bred from an inferior animal. Liberal feeding of colts always repaid the owner, and the young stock should be handled early and frequently.

BOOKPURNONG EAST, May 27th.—Mr. K. O. Schulze read a paper on "Fences on the Farm," in which the subject was dealt with in detail, and he concluded by describing a model fence. He favored boundary fences being netted on rabbit-infested areas. Posts for such fences should be 20in. in the ground and 3ft. 8in. above ground. Division fences should carry six wires, a barbed wire being on top, and the spaces between the other wires 11in., 8in., 7in., 6in., and 6in. That arrangement would result in the bottom wire being 3in. from the ground.

BOOKPURNONG EAST, July 13th.—Mr. Henshaw Jackson, the Wool Instructor at the School of Mines, delivered an address on sheep and wool, and the types best suited for the district.

MYPOLONGA, July 12th.—A practical demonstration of milk testing was given by Messrs. Cailes and Kleemann, and, in answer to questions, Mr. Cailes advised that cream should be stirred three times daily in order to permit gases to escape. It was also necessary to ensure that the cream was at a sufficiently low temperature in summer before churning.

POMPOOTA, July 6th.—In the course of a general discussion it was agreed that the cultivation of passion fruit would be profitable if the vines were planted between trees in the orchard because they would yield fair returns during the period anterior to the fruit trees coming into bearing. Members also agreed that strawberry plots in the area below Murray Bridge produced high-class fruit for several months, and, if markets could be found, the culture of the berry offered attractive prospects to small holders. It was also stated that quince hedges on reclaimed plots were proving valuable as breakwinds and heavy fruit producers.

SHERLOCK, July 12th.—In the course of discussion after the business of the annual meeting, Mr. D. Nock stated that he was applying quick lime to his land through the drill at the same time as he sowed the wheat. The general opinion of members was that lime should be applied when the land was fallowed, or at all events some weeks before the crop was drilled in.

STIRLING'S WELL, June 17th.—Mr. W. McGlasson delivered a lecture on farm buildings. He observed that in pegging outbuildings, instead of using a small square about 1ft. in length, an easier and more accurate method was to make a triangle with sides 3ft. x 4ft. x 5ft. at one or two corners. If the triangle were measured out properly, the building would be absolutely square. In constructing a tank stand, the base should be larger than the top, and the wall sloping inwards, which produced a far stronger and neater work.

WOODLEIGH, July 15th.—Mr. Henshaw Jackson delivered an interesting address on wool.

WOLLOWA, June 16th.—A paper was read by Mr. E. K. Mallyon on "Chemical Action," in which the processes in the change of the form of matter by decay, fermentation, and fire were described.

## SOUTH AND HILLS DISTRICT.

### KANMANTOO (Average annual rainfall, 17.90in.).

June 17th.—Present: 10 members.

PRUNING FRUIT TREES.—Dealing with the subject of "Pruning Fruit Trees," Mr. C. J. Downing remarked, in a paper on that subject, that June and July were the usual months for pruning in that district, but the time depended largely on the kind of tree to be treated. The time to prune could be determined by the shedding of the leaves, when the spurs, buds, and decayed wood could be more easily discerned. Apricots, peaches, and most kinds of stone fruit were the first to be pruned, just as they were the first to shed their leaves. Pruning shears or secateurs and saws should be kept sharp and well set in order that the young tender shoots might not be bruised in cutting. The shears should be held with the blade towards the trunk of the tree and the hook against the part to be cut, and they should be operated with a firm even pressure, and not jerked. Care should be taken to form a young tree in such a way that neither the wind nor the sun would be likely to destroy limb or fruit. The cup or wineglass shape was considered best, some of the benefits being facility in pruning and the gathering of fruit. It was also an advantage in cultivating, because it was possible to plough much closer to the trees. All limbs crossing one another or growing towards the centre should be removed, as well as any decayed shoots. When a tree had been pruned correctly for a few years it only required to be cut back slightly every year. In trees pruned too severely there would probably be too much wood growth, and the fruit production would be retarded for several years. It was well to keep the shoots on the same level all round the tree, otherwise the highest ones, receiving more sap, would grow more rapidly and deprive the lower shoots of sap, leaving them stunted. That effect could be avoided, to a certain extent, by nipping the top buds out of the highest shoots, and if that were not sufficient, summer pruning might be resorted to. That applied mostly to young trees. Vertical shoots always grew the strongest, because the sap flowed more freely through them than through horizontal shoots, an indication that the vertical shoots ran to wood and the horizontal ones to fruit. Care should be taken, therefore, not to thin out too many horizontal shoots, or there would be a shortage in fruit the following season.

Mixed Farming.—Mr. L. J. Wooley, in a paper pointing out the advantages of mixed farming, said:—"Climate and soil are so favorable to the production of all kinds of grain, fruits, vegetables, and livestock that there is practically no limit to the scope of the mixed farmer in South Australia. A few years ago the land was cropped year after year without a rest, and without manure, with the result that it became impoverished and foul with weeds, and gave low yields. But all this is rapidly giving place to a better system of farm husbandry. The special and peculiar problems of soil and climate, which are always largely governed by local conditions are now better understood. It has been found that fallowing wheat lands in winter and keeping them well worked during the succeeding spring and summer provides an excellent seed bed for the following autumn, and conserves soil moisture so that, even with a light rainfall during the growing period, an excellent crop is secured on fallowed, as compared with unfallowed land. Also the former is much freer from wild oats and other weeds, which tend to reduce the yield of plump grain. On farms of from 600 acres I recommend the third-year system of wheatgrowing, *i.e.*, fallow, wheat and grass. Many of the smaller holdings could practice this system with advantage also. I find that good results are obtained from fallowing to a depth of 6in. to 8in., commencing immediately after seeding, and in the final ploughing prior to seeding, to about half the original depth. I suggest that every farmer should utilise his fallow for growing fodder crops of some kind. On stubble land, sown about the end of March, a mixture of rape, kale and oats would provide feed for stock during the early winter months. Lucerne is invaluable as a summer fodder, especially for dairy cattle. Sheep are indispensable to every farm, not merely as weed exterminators, but as wealth producers. The farmer who has an eye for wool growing, will find the Merino the most profitable class of sheep. Besides the high quality of its flesh makes it keenly competed for by the butchering trade. Breeders of this type should keep in mind the great importance of breeding from the best ewes available, while the selection of a suitable sire is of no less importance. Lamb-raising for market purposes is also profitable in certain districts. Where the farmer is within a reasonable distance of a market, however, the topping up of stores may be found quite as satisfactory as the raising of lambs for market. Special attention should be given to the dairy herd. On the smaller holdings dairying is probably of more importance than sheep, as with a few good cows a very substantial income can be obtained. Three or four first-class milkers well attended to are of less trouble and pay better than double their number of the ordinary run of cows. The best all-round cow for the farm is probably the Shorthorn, which, in addition to being a good milker, is valued for beef purposes. Other good strains are the Ayrshire, Holstein, and Jersey. Holsteins are great milk producers, though the percentage of butterfat is hardly equal to that of the Jersey or Ayrshire. However, the Holstein has proved excellent to cross with both the Ayrshire and the Jersey. Cows, to do well, require to be kept warm, and beneficial results would be obtained from rugging. Pig-raising is also very profitable with dairying. Poultry is one of the chief byproducts of the farm, and farmers should endeavor to make a continuous improvement in the class of fowls kept. A small portion of the land should be planted with fruit trees and vegetables of some choice varieties sufficient for family requirements.

## MOUNT BARKER (Average annual rainfall, 30.93in.).

May 17th.—Present: 46 members.

Care of Farm Machinery.—Commenting on the care of farm machinery, Mr. F. Simper, in the course of a well-considered paper on that subject, said that the plough should be carefully set by the maker, and perfectly adjusted by the user, in order that it might do its work soundly and satisfactorily. If the implement became strained or bent, it should be adjusted immediately or inferior work would result. When axles became worn, the wheels wobbled, a defect which might be remedied with a little packing of binder twine flattened out, or horsehair. When in use axles should be greased daily, and at the end of the season mould boards and discs should be oiled or greased and put away. Harrows should be placed so that the tines would not rust in the ground. The woodwork of all implements should be painted occasionally, and the iron parts also, but not so often. The life of a machine could be appreciably prolonged by keeping all the bolts tight and the bearings clean. It was necessary to keep the seed drill free running in all its parts. By neglecting to cover the machine in wet weather the manure became clogged, and cogs and spindles were broken and uneven distribution resulted. It was necessary to keep the small axles in disc drills well oiled. Some of the wear on the discs could be avoided, and the draft lessened, by attaching cocktail harrows to the rear, a method which had the advantage of helping to cover the grain, and permitting the discs to do their work at a shallower depth. All the mud should be cleared off the machine, and the discs oiled before being put away. Before harvesting was commenced all the requisite machinery should be thoroughly overhauled, bolts tightened, broken or worn parts replaced or repaired, bearings packed up in order to make the cogs run in line, and everything put in good working order. Leather belts required to be well dressed with castor oil to increase their gripping power, and, if treated in that way required no sticky compounds to keep them on. The knotter of the binder, the most troublesome part of the machine, required to be kept clean, because if rusty when cutting commenced a breakage might be caused or the machine severely strained. It was essential that the blades should be kept sharp, and all necessary parts thoroughly oiled three times a day. It was well to use a little kerosine with the oil the first time for the season, to free the bearings. Ledger plates demanded careful attention. When in good order they should allow the knives to run level, and, if the top edges became rounded, they could be greatly improved by filing them straight and square—the filing to be done upwards, and from the bottom of the fingers. To ensure the beaters of reel running parallel with the fingers when in the crops, they should be set, at rest, with the end near the grain divider a little higher than the inside end, because there was always a tendency in the outside end to drop. In a light crop large sheaves could be tied with advantage, as it saved twine, but in a heavy crop the compressor arms should be adjusted to give a sheaf on the small side, and thus avoid the straining of the knotter through being choked. All canvas should be removed, and all tension springs loosened before the binder was put away. Heavy oil was required for the stripper, because thin oil ran away quickly in hot weather, resulting in hot boxes and spindles and heavier draft. When starting a stripper into a crop, the belt should be gripped and pulled backwards, in order that the parts might develop rapid action as the horses commenced to move. Adoption of that method minimised choking, prevented breakages, and saved waste of grain. When not in the crop, the machine should be thrown out of gear. If at all damp when commencing work of a morning, it was wise to take only part of a cut, as it would relieve the horses and render the stripper less liable to become strained. The first essential in the care of a winnower was to preserve the seives and screens from rust. Chaff-cutters and threshing machines needed proper setting in order that all pulleys should run in line. If it were not intended to move the machines often they might be set in concrete to prevent them getting adrift. All engines required to be kept thoroughly clean, or the full power would not be derived from them. Whilst still warm after use the outside of the engine should be rubbed with cotton waste to clean it. The covers might be taken off in spare time, the oil drained off, and the cylinder and piston cleaned. All bolts should be kept tight, and the engine should only be fed with good, clean oil. In conclusion he emphasised the absolute necessity for providing for the protection of implements and machinery from the weather an iron shed, from which fowls should be rigidly excluded. Finally there should be a place for everything, and everything should be in its place.

Makes of Farm Machinery.—Mr. B. Pope read a paper on this subject.

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## MILANG.

June 10th.—Present: 37 members.

Poultry Keeping on the Farm.—Extensive statistics were quoted by Mr. D. J. Turvey in a paper on "Poultry Keeping on the Farm," to show the extent of the egg industry in America and the income available to egg-raisers in Australia, using for the latter proposition the figures of the last Burnley egg competition.

He strongly recommended White Leghorns as the most profitable breed, though Black Orpingtons, Silver and White Wyandottes were good payable breeds, which were useful for the table, and had become exceptionally fine egglayers, where proper attention had been paid to their development in that respect. Housing was necessary for the fowls, in order to stimulate laying in the winter months, when eggs were dear, and that they might be fed properly. A scratching shed should be provided for laying hens, and they should be fed in it. They should be kept warm and busy; the busiest hen was the best hen. Fowlhouses should face the north, to catch the morning sun, and be sheltered from rough, cold weather. They should be roomy, but wood should not be used in their construction, because it afforded harbor for vermin. Perches should be on the same level, to avoid fighting for positions on the top. They should not be higher than 18in. or 2ft. from the ground. Wire-netted runs should be provided in front of the house, and wire-netted lucerne plots at the rear, with a plentiful supply of clean, fresh water. There should be no overcrowding, which always brought about disaster. It was far more profitable to sell the surplus stock at market rates. Every bird should yield a profit, and the unprofitable ones should be weeded out. For egg production pullets were more profitable than older hens, and it was a mistake to keep hens beyond their second year. The old stock should be disposed of in the late summer or early autumn. In mating, strong, healthy birds which were good layers should be selected, and the male bird should be descended from a good laying strain. Breeding pens should consist of from six to 10 hens to each male, and they should be mated 10 or 12 days before the eggs were used for incubation. For feeding, a ration of two of bran to one of pollard might be supplied in the morning, green feed in the middle of the day, and grain about 4 p.m. There should always be a liberal supply of grit and charcoal, and a small amount of animal food, which greatly stimulated egg production, should also be given.

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## NARRUNG (Average annual rainfall, 17in. to 18in.).

June 17th.—Present: eight members.

Ploughing and Sowing.—A paper on "Ploughing and Sowing" was read by Mr. L. Thacker, who recommended ploughing to a depth of 4in. or 5in. Crops were always best where the ploughing was deepest. It had been observed that where rabbit burrows had been ploughed in the crop was most prolific. He preferred the set plough. In sowing oats it was advisable to drill 1¼bush. or 1½bush. to the acre on the light soil of that district, and 2bush. on black soil. Drilling should be deep, and for hay crops the ground should be cross-drilled, and the crop should be sown as early as possible.

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## PORT ELLIOT (Average annual rainfall, 20.33in.).

June 17th.—Present: seven members.

Sheep for Farmers.—"Farmers should rear their own sheep," declared Mr. Jas. Chibnall in a paper on the sheep for farmers. The flock, he said, should be commenced with large-framed, well-shaped Merino ewes, which should be crossed with Lincoln or Leicester rams, the English Leicester for choice. He favored medium-sized sheep, as they were easier to keep, and the joints were more suitable for general requirements. A beginning could be made with 50 Merino ewes and one ram (Leicester), which could be bred from as long as they would produce. The reason for suggesting 50 ewes and one ram was that that was more likely to produce an even lot of first cross ewe lambs for a foundation. The pick of those first cross ewes should then be crossed with a Merino ram, plain-bodied, and as long in the staple as possible. After that cross, the breeder should use his own judgment, and then a dense-fleeced Merino ram would probably be most suitable. The Leicester ram should then be reverted to again. When sufficient ewes of one type had been secured, that standard should be maintained, and the ewes could be sold or fattened. Wether lambs could be marketed. If the price of wool did not decline, it would be better to keep them until 4-tooth or 6-tooth, so that there would be an annual draft of first-class sheep, which, at present rates, would realise a substantial price. Mr. H. Welch favored Lincolns for farmers, especially in the southern parts of the State, for their wool was valuable and their carcass large. Mr. Cudmore was well satisfied with the results from crossing Merino ewes with a Leicester ram. Members referred to the difficulty of securing early lambs from English breeds, especially Shropshires.

BLACKWOOD, June 19th.—In a paper strongly advocating the use of softwood fruit cases, Mr. C. D. Gotch said that they were lighter to handle ,and did not shrink and buckle in the same way as hardwood cases, especially if the latter were made of green wood. Mr. D. R. Williams read a paper dealing with the life history of the cockchafer. The grub, he explained, subsisted on the small roots of herbage, trees, or shrubs. The mature insect wrought destruction by feeding on the leaves of practically any plant. After dealing with the life cycle of the insect, the writer of the paper referred to the many enemies which kept it in check.

CHERRY GARDENS, June 13th.—Mr. S. W. Chapman read a paper, in which he described the cultivator, which he had found most effective in his orchard, which was fairly level with loose soil. Members advocated working orchard land down to a fine tilth with the cultivator, thus assisting the retention of moisture.

CHERRY GARDENS, July 11th.—Mr. A. J. Mildwater read a paper entitled "Growing Onion Plants," and recommended the selection of the best-shaped onion, and not the largest size, for seed. Onions for seed should be kept in a dry place until spring, and then planted in good soil. When ripe, the seed should be gathered, cleaned, and hung in small bags, until the time for planting arrived. Sowing should take place in April, in order that the plants might be up before the rain set in. In preparing soil for planting it should be well dressed with manure, and well watered to bring up all the weeds. The seed should be planted in rows about 12in. apart, and should be sown thinly to produce strong, healthy plants. By planting in rows artificial manures might be applied whilst the plants were growing, and the soil between the rows hoed to keep it in good condition. For early market, he preferred the White Spanish, but for keeping and later use Brown Globe was a sound variety. Mr. H. Paddick preferred raised beds, 2ft. or 3ft. wide, and sowing broadcast.

IRONBANK, June 17th.—Mr. W. Coats read extracts from a publication dealing with the tillage of orchards, and members agreed that, in that district, tillage of the orchards was necessary. In answer to a question, Mr. Coats said that the best method to grow mangolds was to make holes with a wooden dibber the desired distance apart, fill the holes with rotted yard manure, and plant the mangolds in the manure.

MYPONGA, June 14th.—Mr. J. J. Muller read a paper on "Making Farm Life Attractive," advocating thrift, sound business principles, and industry, which meant prosperity, the most attractive quality of a farm.

STRATHALBYN, July 11th.—Mr. Springbett read a paper on vine pruning.

## SOUTH-EAST DISTRICT

### KYBYBOLITE (Average annual rainfall, 22in.).

June 22nd.—Present: seven members.

**Breed and Care of Cows.**—As the result of 25 years' experience Mr. C. H. Scholz declared, in the course of a paper on the "Breed and Care of Cows," that, after trying a number of breeds, he found the Jersey the best for butter purposes, though other breeds gave more milk. He recommended feeding cows with a kerosine tin full of chaff and a quart of bran night and morning, and he instanced improvements he had obtained in milk yields by that means. Cows also required a good grass paddock, but should not be run with sheep and horses, as they required longer feed. A lucerne patch should be provided for summer feed. With chaff at £2 10s. or £3 per ton it paid better to feed it to cows than market it. Cows should be housed at night, and afforded accommodation to enable them to lie down. The house should be roofed with straw, which was cheaper than galvanized iron and not so cold in winter. The floor should be blocked, and the shed should be wide enough to provide a passage along the front for feeding purposes. The manger should be higher in front than at the back, so that the cows should not waste the feed. A yard big enough to hold all the cows on the farm should adjoin the shed. It should not be too small, and should be metalled so that it might not become boggy in winter. Mr. L. S. Davis advocated wetting chaff before feeding, as it assisted the action of the digestive organs. Mr. H. R. Scholz preferred rugging cows to housing them. Mr. H. Bradley favored the Shorthorn milking strain, as he considered the Jersey too delicate. Mr. S. Shepherd also favored the Shorthorn milking strain if required for beef as well as milk, but as that was not a beef-producing district, he preferred the pure Jersey strain, and was against mixed breeds. In a general discussion members agreed that a heifer should be sent to the bull when 18 months or two years old. Mr. Shepherd deprecated the practice of keeping the first calf, as it tended to deteriorate the quality of the breed.

## MOUNT GAMBIER (Average annual rainfall, 32in.).

Present: 25 members.

Exhibits.—A sample of ensilage, composed of lucerne, subterranean clover, with a little silver grass, was tabled by Mr. H. Buck, who also exhibited several specimens of 90-day and Horsetooth maize.

Pickling Wheat.—A short address on this subject was delivered by Mr. Collins, and a lengthy discussion followed.

Planting of Fruit Trees.—In a paper on this subject Mr. R. Fowler said:—"Preparation of the soil requires careful attention at the outset, as once the trees are planted it is not practicable to do more than the ordinary cultivation. If virgin land, it should be thoroughly cleared of all trees, stumps, roots, and stones, and the whole surface should be ploughed to a depth of 6in. or 8in. If the subsoil is hard, it should also be broken up with a subsoiler, but not brought to the surface. This is done by letting the subsoiler follow the mouldboard plough. As most of the land in this district has an open or gravelly subsoil, it is not so necessary to subsoil. This work is generally performed in the autumn or spring, when the ground is sufficiently wet to permit a plough to work, but in this district it may be done almost any time. Neither is it necessary to discuss the question of drainage, though this is an important factor in localities that have a stiff clay subsoil and a heavy rainfall, and in irrigated orchards. Having cleared and ploughed the land, proceed to mark out where the trees are to be planted—good short stakes should be provided for this purpose. The distance apart the trees should be will depend upon circumstances to some extent. It is usual, in ordinary soils, for commercial purposes, to plant 20ft. apart each way on the square. This will give 108 trees to the acre, and is certainly the most convenient method of cross-working and all the various other orchard operations. In a small home garden the distances may be reduced, to suit conditions, down to 16ft. apart; but that is about the limit. It may seem at first quite far enough, but allowance must be made for the growth and future working. If you desire to plant 20ft. apart make a line, having the 20ft. spaces marked off, then peg down each side carefully, allowing at least 20ft. to 30ft. for headlands, and if a breakwind has been planted—and this is a very necessary protection and one that should always be provided—the first row should not be nearer than 50ft. or 60ft. Then, starting from a right-angle corner, draw the line across from peg to peg, and carefully mark off the places. Having pegged out the ground, holes should now be dug about 4ft. square, with the centre of the hole where the tree will be placed. It is not recommended to dig deep holes. A good plan is to dig down about the depth of the spade, removing the soil, then loosen up the subsoil the depth of the spade again, but do not remove it, and if a supply of well rotted stable manure is available mix four or five good shovelfuls with the subsoil, and also a little bonedust or basic slag can be added. The holes can then be almost filled in again and the tree planted. Considerable care should be taken over planting. First of all, all broken roots should be carefully cut back to healthy tissue, and all shrivelled fibrous roots may be cut off as well, and the tree should not be planted any deeper than it stood in the nursery. This will generally be indicated by the soil marks and discolored bark. The roots should be spread well round, and with a downward tendency, the tree being planted on a small mound of earth close to the stake. It very often happens with nursery stock grown close together that the roots have a tendency to grow stronger across the rows than along them, and where a tree is provided only with one or two strong roots it is well to place one in the direction the prevailing wind comes from to brace it up, otherwise there is a danger of the tree being blown over. The soil should be firmly trodden down between and upon the roots at planting time, and it is better to leave the pruning for a few weeks. The young tree should be secured to the stake. The ground should be securely fenced, made rabbit proof, and should not be used as a run for the calves at any time. For the farm garden a wider range of varieties is available, but the main thing to keep in mind is to have a good succession of fruit, and at the same time the best for eating and preserving purposes, the main object of the garden being to supply a healthy and necessary addition to the daily menu. For commercial purposes consideration must be given to the markets available, the grower of fruit for the local market planting kinds, if possible, that have been proved a success in his own district, and varieties that will come in when best prices are obtainable; while for the grower on a large scale his efforts are generally limited to export keeping varieties and those fruits that can be profitably dried. Fruit being perishable, thought must be bestowed beforehand on the probable outlet for the produce when it is grown. The best time to plant deciduous trees and vines is during early winter—that is in May or June—while the soil still retains some warmth and has received a good soaking rain. They will send out fresh fibrous roots and establish themselves; even though the leaves fall the tops are at rest. Trees planted now will have a considerable start over those planted in August or September, although trees may be planted with success even as late as that. Citrus trees do best when planted out in early spring. The young growth is not then so liable to be cut back by frost as is the case when planted in the autumn. Pruning should be done after the planting, and is an operation very often neglected by amateurs. More often than not trees are planted just as they are received from the nursery. Space will not permit me to go thoroughly into all the reasons for pruning a young tree at planting time, but it is a practice universally adopted by all orchardists, and is based upon sound reasons. The practice is to cut back to three or four main arms, care being taken that they do not all radiate from the same centre, but if possible at regular intervals. The reason for this is that there is not then the same liability to split in after years. The cuts should be clean, and to an outward bud, or in such a position that the subsequent growth will give a regular formation. The stronger the shoot the longer it should be left in comparison with its weaker brother; but, if possible, the topmost buds of the pruned limbs should be as nearly as possible on the same plane. One advantage of pruning after planting is that it is much easier to select buds to cut. The cut usually should be slanting, and close about the bud. This gives the most favorable condition for speedy healing, and it is well that wounds on fruit trees should heal as quickly as possible to prevent permanent injury and decay. Care should be taken that the cut is not too close, otherwise the shoot arising therefrom may split off and destroy the shape of the tree. Sometimes, with very upright growers, the cut is made 1in. or so above the bud; this has the effect of making the tree grow obliquely to the stem. It is a good plan to tie straw round the stem of a young tree to protect it from rabbits and hares, and also from the direct rays of the sun until protected by some of its own foliage.'' Mr. Fowler recommends the following varieties of trees:—Apples—For export—Cleopatra, Jonathan, Dunn's Seedling, Rome Beauty; for small gardens—Gravenstein or Irish Peach, Jonathan, Dunn's Seedling, Rome Beauty, Cleopatra, Nickajack, or Rokewood. Pears—Export—Glou Morceau, Burre Bosc, Josephine, Winter Nelis; for small gardens—Duchess, Packham's Triumph, Vicar of Winkfield. Peaches—Triumph (Sea Eagle), Briggs' Red, Early Crawford, Lady Palmerston, Salwey. Nectarines—Goldmine, Stanurik. Apricots—Oullin's Early, Moor Park. Plums—Angelina Burdett (blue or black), Early Orleans (red or purple), Coe's Golden Drop and Green Gage (yellow and green). Drying Plums—Fellemberg Splendor, Prune D. Agen, Coe's Golden Drop. Canning—Coe's Golden Drop, Reine Claude de Bavay. Damsons—Shropsire, Vermont. Japanese Plums—Burbank, Wickson. Cherries—Early Lyons (black), Biggareau Napoleon (amber), St. Margaret's (purple to black). Figs—White Genoa, White Adriatic. Almonds—Hatch's Nonpareil, Ne Plus Ultra, Brandis. Oranges—Washington, Thompson's Improved. Lemons—Lisbon, Eureka. Quinces—Champion, Pineapple. Grape Vines—Black Hamburg, Wortley Hall, Red Prince, Red Malaga, Crystal, Early Green, Doradillo, Muscat, Gordo Blanco, Waltham Cross. Strawberries—Melba, Royal Sovereign, Gandy. After the address Mr. Fowler gave an interesting exhibition of the pruning of young trees on planting.

## SANDALWOOD.

July 15th.—Present: 16 members and one visitor.

POULTRY.—In a paper on poultry, Mr. A. Grant advised selecting White Leghorns, which were good layers and very hardy. To improve the flock, a pen of from six to 10 second-year hens should be mated with a first-year cockerel from a hen with a big laying record. If the pullets were single tested and the prolific layers bred from in their second year, good results would follow. Neither small, over large, nor misshapen eggs should be set. Chickens hatched in August or September should commence laying at five months old, before the cold weather commenced and eggs were scarce. Wet or dry mash of bran and pollard and meat meal should be given to fowls the first thing in the morning, green feed at noon, and grain at night, and they should have access to shell grit, charcoal, and clean water. Turkeys were profitable, and when allowed to roam over a large area, gathered much natural food, and thus reduced the feed cost. They were excellent sitters and good mothers. Mr. Ritchie preferred feeding grain in the morning and at night a hot mash, in which a teaspoonful of mustard for every six fowls was mixed. Mr. Oakenshott preferred Silver Wyandottes to White Leghorns.

## WIRREGA (Average annual rainfall, 19in. to 20in.).

May 13th.—Present: 11 members and one visitor.

PIGS ON THE FARM.—To raise a payable good type of pig the main factor was the selection of a boar, said Mr. W. R. Fairweather, in a paper dealing with the raising of pigs on a farm. In the selection of a boar, he declared, it was necessary to see the sire and dam, in order to determine whether he was suitable for the sows with which it was proposed to mate him. The boar should not be used for stud purposes until eight or nine months old, when he might be mated with a few sows, but the number should be limited until he was 18 months old. If used sparingly when young, the progeny would be stronger and better developed. The boar should not be permitted to get too fat or he might be rendered useless. The sows should be long, roomy, and deep, with broad loins and strong backs, qualities which afforded capacity for carrying big litters. The teats should be about 12 in number, even in conformation, and somewhat coarse. Some sows were fit to be used for breeding at the age of eight months, but others were better left until 10 or 12 months. If used too young, they produced either small litters or large litters of uneven, weakly pigs. When a sow had a small litter, say five, then five of her teats would be developed at the expense of the others. If the second litter were a large one, some of the young ones would be developed poorly and be of uneven growth, because some of the pigs would depend for their nourishment upon the badly developed teats. Breeding should be so arranged that the sows would farrow in the spring or summer months, because it was trying for the sow to raise a litter in cold weather. Sows should be given plenty of green feed and should be liberally fed, but not overfed, for by that means a whole litter might be killed. Badly fed sows produced inferior stock. After farrowing, the sow should not be disturbed for 10 or 12 hours, and then should be given a warm drink. When about one month old, the young pigs should be weaned, but it should be done gradually, in order that the growth might not be checked. It was a good plan to leave a couple of the young pigs with the sow to prevent the milk accumulating in the udder. Buyers preferred bacon pigs weighing from 150 to 160lbs. dead weight, which with good, well-regulated feed should be attained at the age of seven months. He deprecated heating or cooking grain food for pigs, because they ate it too quickly and did not digest it properly. The grain should be either soaked or crushed, preferably the latter. He preferred the Berkshire breed, which was hardy, a good grazer, and never suffered from sun scald, which was a serious defect in all white pigs. If the sow were of good type, her breeding was not material. Considering the price of pork in connection with the rates ruling for farm crops, especially oats, which did well in that district, it would pay to feed grain to pigs instead of marketing it.

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CLARENCE GOODE,

*Minister of Agriculture.*

# POINTS FOR PRODUCERS.

## Stallions Slow at Service.

At the commencement of the season it is quite a general thing to receive a number of communications reporting that stallions are slow at service. The very fact that these complaints are, as a rule, confined to the early part of the season, should indicate that in due course Nature will regulate the trouble without the intervention of drugs. The use of these, says the Veterinary Lecturer (Mr. Place) is much to be decried. In any case, they are only stimulants, and do not produce good results. A correspondent, seeking advice on this matter, was recommended by Mr. Place to try half a pound of desiccated malt or malt and carbonate of iron, both of which are prepared by veterinary chemists. Given in the morning feed they will have a better result than drugs; or a quart of stout in the feed daily for a week or so will often do what is required.

## Maggots Inside of Sheep's Horn.

A correspondent from the North was somewhat bewildered on finding fat maggots drop from the horn sawn from a 6-tooth wether. Others were found inside the horn, and these, together with the horn, were forwarded for inspection. The Veterinary Lecturer (Mr. Place) says:—"The specimens received are larvæ of the fly *Oestrus ovis*, common in all parts of the world. The fly is rather larger than a house fly, yellowish grey, and slightly hairy, fine silky down at base of wings; length of body, 10-12mm. (one millimetre equals one-twenty-fifth of an inch approximately). It flies only in dry warm weather during the summer months, hiding in holes till mating time, when it may be found on warm rocks, &c. The impregnated female then seeks sheep, which are afraid of her, and bury their noses in dust or between their forefeet, but when they are sleepy and chewing their cud she lays eggs on their noses, which they try to rub off and often get sore noses on account of the vigor they use. The larvæ hatch out of their tiny kidney-shaped eggs and wander up the nostrils, taking about 10 months to undergo different changes (those sent appear to be about seven months). In these wanderings the larvæ get into the sinuses (hollows) of the face and into the horn sinuses, which communicate directly with the face, explaining the mystery of their being found in the horns. When ready as soft reddish nymphæ they are snorted out of the nose. They spend about six weeks as pupæ, dark and brown, and then hatch out as perfect flies; their history being very like that of the botfly of the horse. Preventive treatment consists in dressing the noses with something that sticks and smells, such as a mixture of fish oil and Stockholm tar—a rather large order for an Australian flock; but in a small mob this can be done automatically by smearing the mixture on old bags with small holes in them and putting them over rock salt, so that the sheep, in order to get the salt, poke their noses through the smeared holes and dress themselves. All maggots found on slaughter should be destroyed. Treatment.—Snuff does some good, but as the maggots are stowed away in the horns, &c., it does not shift them all. The fumes of burning tar shift a good many, but the best way is to bore a hole into the horn sinus at the base of the horn with an ordinary gimlet and squirt in a wineglassful of benzine one part, water four parts. The hole is plugged with tar after. All these fly pests are comparatively easily handled in their larval (maggot) stage, but it a hopeless job to go chasing them when they can fly, so a word to the wise is enough."

## APHIS ON CABBAGES.

"The members of the cabbage family are freely attacked by aphides (*Aphis brassicae, Linn.*) when grown during dry weather," says Mr. Quinn, in reply to an inquiry. "The water applied is not a factor in the propagation of the pest, only in so far as, if the water be unsuitable and the plants do not thrive upon it, they would be more likely to suffer more severely from the attacks of the pest than otherwise. The cabbage is not a success in this State during the summer months, excepting in the cool secluded gullies in the ranges. The heat causes the foliage to develop a tough glaucous epidermal coating, apparently to retard excessive transpiration, and this destroys that succulence of the tissue which makes the cabbage palatable and desirable. The aphides may be destroyed by spraying the plants occasionally with any aphicide such as kerosine emulsion, resin compound, or tobacco and soap wash. These remedies prove useful in keeping autumn-planted cabbages clean until the advent of the rainy season, when the blight practically disappears."

# INQUIRY DEPARTMENT.

**Any questions relating to methods of agriculture, horticulture, viticulture, dairying, &c., diseases of stock and poultry, insect and fungoid pests, the export of produce, and similar subjects, will be referred to the Government experts, and replies will be published in these pages for the benefit of producers generally. The name and address of the inquirer must accompany each question. Inquiries received from the question-boxes established by Branches of the Agricultural Bureau will be similarly dealt with. All correspondence should be addressed to "The Editor, *The Journal of Agriculture*, Adelaide."**

[Replies supplied by Mr. F. E. PLACE, B.V.Sc., M.R.C.V.S., Veterinary Lecturer.]

**"N. K.," Leighton, has horse troubles—Subacute colic intermittently, especially after feeding.**

Reply—Is it possible that the horses are watered after feeding. If so, gradually change round to watering first. The symptons point to indigestion; worms may be involved in the affair too, but probably 10 drops tr. nux vomica on the tongue morning and evening for 10 days will put matters right. If it does not, then write again.

**"J. P. G.," Warnertown, has a cow with hard quarter.**

Reply—The symptons point to simple inflammation of the affected quarter, and it would be well to bathe frequently with hot soapsuds, well rubbing and drying after; also give the cow ¾lb. Epsom salts and ½oz. ginger in a quart of warm oatmeal gruel. If this does not put matters right then give her 10 drops of tr. phytolacca morning and evening on her tongue and bathe the udder with 20 drops of the same tr. in a tablespoon of glycerine.

**"A. F. Y.," Port Broughton, had a foal three weeks, severely injured in stifle, leg much swollen, hard round joint with soft spot in front, unable to rise without help.**

Reply—The symptons well describe the disease known as joint felon, which is a specific disease commencing during life before birth and showing as described. It is difficult to deal with, but success follows the opening of the abscess when ripe and the cleansing of the sac with a 20 per cent. solution of acetozone (Park, Davis. and Company), also the internal administration of a wineglassful of the same solution twice a day after dressing the abscess. The drug is dear, but it is the only one likely to give a successful issue.

**"A. V. S.," Hallett, states that a cow, not known to be in calf, was fattened for sale, but calved when almost prime beef; calf, as was likely from fat dam, was weak and did not suck, so cow was milked out (beginning of trouble), and seemed a little stiff; in evening, after being in a crop of wheat, seemed to hold milk; next morning at 8 appeared to be resting lying down, but would not get up (could not), and became uneasy; at 11 was slightly blown in spite of opening medicine given, and kept throwing head round to flank. At 1 much worse, and struggling and blown, back raked blood with dung hard; 3 p.m., opportunity for *post mortem*, all organs appeared healthy.**

Reply—A typical case of so-called milk fever or drop after calving, excellently described by an observant man unacquainted with the disease. When first noticed she should not have been milked out, but the udder should have been distended with air, and the rest of the treatment often described given, and probably a quick recovery would have ensued. Points to notice—Cow fat, easy calving, indefinite symptoms at first, no inflammation, *post mortem*, apparatus for treatment, a quill and bicycle pump.

**"A. V. S.," Hallett, states that a mare has a milky discharge from bearing, always horsing, but not conceiving.**

Reply—Chronic uterine catarrh, useless for breeding. If treatment is adopted, periodical douches of solution of perchloride of mercury, 1-2500 and 5grs. trit. merc. viv. twice daily on tongue for a fortnight, then tr. pulsatilla 10 drops similarly reverting to merc. v. after a fortnight's interval of rest; but the results will probably not compensate for the trouble, and she is likely to infect stallion.

"G. G. F.," Tintinara, reports foals troubled with furred sores in mouth and salivation.

Reply—The symptoms are those of acute stomatitis, and there is a possibility of others becoming affected on the same land, but not necessarily so. Should they, dress the mouths two or three times a day with a solution of a teaspoon of boracic acid in a pint of warm water.

"H. B.," Hamley Bridge, has horses with boils on shoulders and necks.

Reply—These are glandular enlargements, and the oats are partly responsible. Cut them off entirely and substitute bran for a few weeks, also give a tablespoon of sulphur to each horse once a day in feed for a week. Dress the boils three times a day with 2ozs. white lead shaken up in a pint of neatsfoot oil; if at work, which is better, dress the collars also.

"P. D.," Lucindale, has a mare troubled with warts.

Reply—If the mare is a grey the following treatment will not answer, and other advice would be given on receipt of the information. If of any other color and the warts have a root, tie tightly with horsehair or slip the rubber ring of a soft drink bottle over them. When they have dropped off mix some Cooper powder dip with lard to a thick paste, about half and half, and apply to the root daily for a week or so. This should do away with the trouble.

"V. J. S.," Clarendon, reports that a sow has had several litters but does not conceive.

Reply—Drugs are of no use in this respect, although a German one, Yohimbin, has been much belauded. There are so many factors governing such a case that advice cannot be useful without a personal inspection. Try keeping her poor and giving stimulants, such as mustard and pepper, in the food.

"S. S.," Mount Compass, reports that a horse was afflicted with sudden lameness, followed by puffing outside knee, which does not yield to fomenting and rubbing.

Reply—There has been a strain of the synovial sacs of the extensor tendons, and there may be a permanent enlargement, especially as blistering has been carried out too early. Try rubbing in a little blue ointment (Ung. hydrarg.) once a day, and each evening bandage the knee with a bandage wet with a lotion composed of tr. arnica 1oz., meth. spirit ½ pint, water ½ pint.

"C. M. W.," Netherton, has mare, three years, which slipped foal, and is pining away, as there is a difficulty in feeding.

Reply—The natural upset of teething is increased by the constitutional disturbance due to slipping foal. It would be well to give her as much grey powder (hyd. c. cret.) as will lie on a sixpenny piece twice a day for a few days, then to give her ten drops tr. arsenicum twice a day on the tongue for a week.

"T. W.," Borrika, has a horse, seven years; every few weeks sheath swells.

Reply—This is due to bloodworms breeding. When next it occurs, give a tablespoon of sulphur and a teaspoon of saltpetre once a day in feed for a week or so, and afterwards give two tablespoons of Fowler's solution of arsenic once daily in feed for a fortnight. Also clean out sheath with soap and water.

"L. R. W.," Arno Bay, seeks advice regarding worm tablets for horses.

Reply—The tablets are not likely to deteriorate if kept in a dry place. It is not advisable to treat in-foal mares, but it is not necessary to wait till weaning. The tablets may be given to horses if desired; four crushed and mixed with a little damp bran in feed once daily for ten days or so would be a fair dose for one horse.

"J. W. H.," Taplan, has a cow which jumped through fences, cut and bruised teats; blood-stained milk.

Reply—Mix an ounce of tincture arnica with a pint of oak varnish, or less in proportions, and paint damaged parts of teats with it after each milking. Also give 10 drops of tr. arnica on the tongue twice a day for a few days.

"C. E. L.," Naracoorte, reports that a heifer, two years, gives stringy and bloody milk from one teat, otherwise health good.

Reply—The trouble seems to be at the root of the teat, where local inflammation is going on. Give her a drench of 1lb. Epsom salts, 1oz. sulphur, ½oz. ginger, in a quart of warm beer; rub the quarter well after milking twice a day with hot soapsuds, and report again after a week's treatment.

"L. R. C.," Lenroy, Pata, has a cow lame near hind leg, crack above hoof, bowels all right.

Reply—The trouble is probably inflammation of the interdigital gland, known in the old country as loore. Treatment:—Give a pound of Epsom salts, an ounce of sulphur, and ½oz. ginger in a quart of warm water. Poultice the foot with bran for a few days and then dress the hoof by rubbing a piece of old rope dipped in tar between the claws daily. Report progress in a fortnight.

"H. R. L.," Laura, has a mare, six years, drowsy, languid, and off feed.

Reply—The symptoms are common to many diseases, and generally point to digestive inefficiency, which should be remedied by the nux and arsenic, but it would probably be well to feed on bran mashes only for two days and then give a six dram physic ball. When the effects of this have worn off, a week's course of Fowler will do good.

"E. L. W.," Karoonda, has a draught mare, 16 years, which cannot get up without help, sits up like a dog; every eight or nine days water is milky, thick, and smells badly, poor appetite.

Reply—This is a complicated case, probably of stomach abscess and sabulous deposit in the bladder, possibly also kidney abscess, and it is doubtful whether she will pay for treatment, but if desired give her a teaspoon of baking soda and ten drops of strong tincture camphor twice a day mixed in a little molasses and smeared in her mouth, also rub her back daily with a strong liniment containing turpentine.

"J. J. C.," Spalding, has a mare which does not seem in pain, but lies down and looks around, not eating, and seems as if trying to swallow and cannot; a thick watery fluid runs from nostrils and mouth.

Reply—The symptoms point to gastritis, which would arise after the heavy rains by the mare swallowing gravel, etc. It would be well to put her on to bran only, and give her 10 drops of tr. arsenicum and nux vomica alternately every three hours until improvement sets in, then twice a day for a few days. A post mortem on the other would have been a great help in diagnosing this. If a post mortem is made on this do not attribute death to the bots which will most likely be found.

"H. E. M.," Ashbourne, has a cow which calved three weeks ago, milked well for two weeks, then got sore teats and fell off in milk; constipation, red water, and staggers.

Reply—This form of red water is common after calving. It would be well to give a pound of Epsom salts and half an ounce of ginger in a quart of warm red wine; this will probably put the constitutional symptoms right, and the teats should be dressed after each milking with boric ointment. If the one dose does not put things right, repeat on the second day.

"F. T. D.," Port Neill, has a mare, three years, staked on side of face, healed all except small discharging pipe.

Reply—Probably if the place of discharge was covered once a day with a powder made of equal parts chlorinated lime and boracic acid it would cease to discharge in a week or two.

"F. C.," Coomandook, reports the birth of bull calf twin with heifer.

Reply—The heifer is the one usually impotent or sterile (freemartin), not being sexually complete, but the apparent bull is sometimes impotent too, so it would hardly be advisable to risk keeping him.

"D. K.," Wirilla, Manoora, has a cow which had difficult calving, is unable to rise, constipated, and passing bowel casts.

Reply—This form of paralysis after calving is not uncommon, and is difficult to cure. It would be well to give her two tablespoons of syrup phosphate co. (Easton) in a quart of beer twice a day for a week; this will regulate the bowels as well. It is useless to attempt to sling a cow in such a condition, but she should be propped up comfortably and all her limbs well handrubbed twice a day. The best feed will be green stuff and crushed oats and bran.

"T. B.," Carrow, has a black cow going blind, eyes turning milky, condition fair, in milk.

Reply—The trouble is caused by parasites in the blood cells producing anæmia, which always manifests itself by the milky appearance of the eyes. As the parasites are transmitted by flies, it is of interest to note that the cow is black, a color very attractive to them. Have a dozen of the following powders made up and give her one twice a day in feed; if there is any improvement repeat for two more weeks:—Carbonate of iron 2 drams, sulphate of quinine 1 dram, arsen ox. 5grs., sugar to one ounce. If she will not take them in feed, drench in a little gruel. Every three or four days blow a small pinch of boracic acid into the eyes.

"A. W. L.," Peake, has a mare due to foal end of September; greenish slimy discharge from bearing during last two months. A week ago udder filled and wax appeared on teats, and mare was a little uneasy, but udder has resumed normal. No movements of foal visible, and mare appears in good health.

Reply—The symptoms certainly point to the mare carrying a dead foal, and the difficulty may be that she is carrying two, one of which died some weeks ago and the other when the udder filled. Keep her bowels free on green feed and give 10 drops tr. pulsatilla morning and evening on tongue till something definite happens. If when she gets rid of what she is carrying the cleaning does not come away quickly, remove it in the way often directed in these replies and clean out the womb by inserting a sheet dipped in a solution of Condy (permanganate of potash). Should she become uneasy, examine her inside an hour or two after to see if help is required.

"T. B. B.," Clarendon, seeks particulars in respect to treating a cow affected with milk fever.

Reply—The amount of air to be pumped into the udder should be sufficient to distend the organ as if it were overstocked, and while it is being pumped in the quarter should be well massaged. If the teats do not retain the air they should be tied with broad tape. As a rule the cow gets up as many hours after pumping as she has been down before. Sometimes a second injection is required. The cow should be propped on her breast and belly so as to get the pressure of her weight on the distended udder, which should not be milked out before injecting. She should be kept warm and comfortable.

"J. E.," Clare, has a grey gelding affected with nasal gleet.

Reply—This is very obstinate to cure, and requires the operation of trephining in many cases. If the horse allows, syringe once a week with a wineglassful of a lotion made of 1oz. tr. hydrastis canadensis to a pint of water. Daily blow in a pinch of a powder made of one part sulphur and seven parts boracic acid, with a dash of snuff added.

"T. B. B.," Clarendon, has a horse, 11 years, which when in harness rocks to and fro, looks over off shoulder, no appetite; symptoms recur every few days, and appear to be worse each time.

Reply—The symptoms point to abscesses in the stomach, possibly involving the liver too, and there is every probability that there will be an early opportunity for a post mortem. It is to be feared that treatment will not be of much avail, but improvement might follow the administration on the tongue every morning of 10 drops tincture nux vomica and a similar quantity of tincture arsenicum each evening for 10 days or so. An ounce of photographer's hypo in the drinking water once a day might also help.

"W. A.," Wanbi, has a draught mare with a hard lump 2½in. across on shoulder.

Reply—The lump is a hardened gland, and the only satisfactory way of getting rid of it is to cut it out. In her case as she cannot work with it, the cut should be ( ) down the front, the fingers should be passed all round the lump, and a root will be found at the back; this must be cut as cleanly out as possible. The edges of the skin wound can be brought together with a couple of pins and horsehair across them, and the operation wound dressed daily with spirits of iodine (iod. resub. 1 dram, meth. spirit 1 pint). If this is done soon the flies will not annoy, and the mare should be fit by harvest.

"E. T. W.," Lameroo, reports lambs stiff in loins and legs.

Reply—The yellow daisies will not hurt if there is sufficiency of other feed, but if in excess they will upset the lambs. The treatment suggested should do good, but is it possible that your trouble is due to marking, in which case blood poisoning may produce the symptoms? Give each affected lamb a teaspoon of photographer's hypo in a little warm water once or twice a day.

"E. L. P.," Mindarie, had a bull, 12 months old, walking with head stretched out, then staggering, frothing at mouth, and distension of stomach; died.

Reply—Post mortem, some toadstools in stomach give the clue; they poisoned the beast. It was a wise precaution, however, to burn the carcases as cause of death was uncertain. This should always be done when practicable, for it prevents the breeding of the maggot flies, which fatten on carrion lying about, and increase in thousands.

"C. J. D.," Harrogate, reports that sheep die almost suddenly, frothing at mouth, tongues black, skins very dark when dried, were seen eating young shoots of sugar-gum a few minutes before death.

Reply—Up to the present there is no direct evidence that sugar-gum shoots or leaves are poisonous, which, in fact, in ordinary circumstances they are not, but occasionally they may produce poisons like prussic acid—glucosides—in the paunch, and it would appear that such is the case here, but should other deaths occur it would be well to inform the Inspector of Stock, Tailem Bend, and he would investigate. There are records of similar suspicious cases in cattle. Treatment if in time—bleed at eye vein or leg vein or by thrusting knife through nose, and give sugar or molasses and warm milk as much as can be conveniently drenched, or if a pipe is handy, to pass down throat about a pint of the mixture.

"R. S.," White's Flat, seeks treatment for a horse with greasy heels.

Reply—The condition you describe is greasy heels, and it would be well to give internally twice a day for a fortnight one tablespoon of Fowler's solution of arsenic, which will be eaten in the feed. Externally apply twice a day some of the following lotion:—Sugar of lead ½oz., sulphate of zinc ½oz., water ½ pint, meth. spirit ½ pint. The condition is generally brought about by exposure to mud and wet.

## TRAPPING EAGLEHAWKS.

The Hon. Secretary of the Goode Branch of the Agricultural Bureau, who has lately succeeded in trapping a number of eagles, describes the method he adopted in securing them, as follows:—Around the trunk of a tree, well out in the open, he erected a cage of wire netting sufficiently large to enable a couple of fowls to run, and outside the netting, at the bottom, three or four traps were placed. He found that the eagles saw the fowls, came down, struck the netting, and then proceeded to walk round the cage in an endeavor to get at the fowls, and were thus secured in the trap. If dingoes or foxes were in the neighborhood, for the protection of the fowls, it was well to put a netting floor to the cage.

# HEALTH AND DISEASE IN PLANTS.

[The second of a course of three University Extension Lectures delivered at the University of Adelaide by Professor T. G. B. OSBORN, M.Sc. (Manch.)]

In the opening lecture it was seen that a fungus disease of a plant is a phenomenon that involves two distinct organisms. In the first place there is to be considered the plant which is attacked, called the host, and secondly the fungus causing the disease, the parasite. Each of these organisms is a living structure, with its own particular life processes, and its own special requirements in the way of food, moisture, temperature, &c. In the case of wheat rust it has been noticed how a variation in the moisture present in the atmosphere, for instance, may play a very important part in determining the seriousness or otherwise of an outbreak in any season. There may be present on the plants in a field of wheat quite a considerable number of rust spots, but if the weather conditions are bright and dry the outbreak will be comparatively slight, and the fungus will do but little damage to the crop. On the other hand, if there be dull, muggy weather, and if the ears be just emerging from the leaves, then there is every probability that a serious outbreak will occur. It is obvious, then, that in considering plant disease we must bear in mind the needs of two organisms—it is not sufficient merely to consider the fungus.

## PLANT PATHOLOGY.

There has, until recently, been a great tendency for the study of plant disease to be little more than the study of the parasite. This is not a true *pathology*, but a *parasitology*—the main interest tending to centre around the disease-producing organism, and not the diseased plant. There has often been the feeling, and sometimes one finds it expressed in popular journals, that if only the fungus were identified all would be simple. This, of course, is not so. Valuable experimental work can be done upon a disease—work that may lead to some measure of control—without knowing the name of the organism producing the disease, or, in some cases, without even knowing if an organism be present at all. The case of animal diseases provides us with a familiar parallel. Because human life or that of domestic animals is so valuable, a considerable science of pathology was developed long before

Pasteur demonstrated that animal diseases were frequently caused by parasitic organisms. Even to-day the studies of the medical or veterinary student are studies of the organism attacked, and its behavior, rather than studies of the parasite.

### HEALTH IN PLANTS.

In order, therefore, to successfully cope with plant disease, we must first clearly understand what happens in the normal condition of health. This is a comparatively new point of view so far as plants are concerned, though Professor Marshall Ward voiced it strongly as much as 20 years ago. It is only of recent years, and especially in the United States of America, that it has become generally recognised. We are now developing a new branch of botanical investigation, one that deals primarily with the plant attacked, and the special way in which it differs from the normal, and one which will lead to a clearer undertanding of the diseases and to their more successful treatment. We must now briefly consider some of the normal life processes of a healthy, green plant.

### GREEN PLANTS AND FOOD.

Plants, like animals, are living organisms, and as such require food. This is a truism, yet there is a certain amount of difficulty in understanding it, for the manner in which a normal green plant obtains its food is wholly different from that found in the case of animals. An animal ingests, or takes into itself, solid particles of food, which are then digested. A portion of the food goes to build up the body of the animal, but the bulk of it is simply broken down to supply the organism with the energy it uses in movement, &c. This use of food has been compared with the burning of fuel in order to supply an engine with the necessary power to run it. The simile is not a good one, and cannot be pressed far, but it may suffice for the present purpose. A green plant behaves quite differently. It ingests nothing. Everything enters it in solution, and even so the substances taken in are very different from the flesh or herbage eaten by an animal. These last are complex bodies, rich in stored energy the chemist tells us, a statement that one can explain by pointing out that they burn readily. The substances entering a plant are not of this type. In the first place there is absorbed by the roots from the soil, water and mineral salts in solution, such as potassium phosphate, nitrate, magnesium sulphate, &c. In order that this absorption may take place the soil must be sufficiently moist or the supply to the plant will be deficient. It must also be sufficiently aerated by good cultivation, and warm enough, for it is a matter of common observation that in cold weather plants make but little growth. Within the plant the water and mineral salts are carried up the stems to the leaves. There a large proportion of the water is lost to the plant by evaporation, but some of it and the mineral salts are retained. But these substances are not food; to understand their use the leaves must be considered.

### THE GREEN LEAF.

Those flattened, expanded surfaces of the plant that are termed leaves consist of a mass of cells, having a sponge-like structure, the cells being separated by numerous air spaces. They are protected externally by a skin, and supplied with numerous veins connected with the conductive tissues of the stem. The air, which contains carbonic acid gas, passes through pores or stomates that are found chiefly on the lower surface of the leaves, into the air cavities within the leaf, and

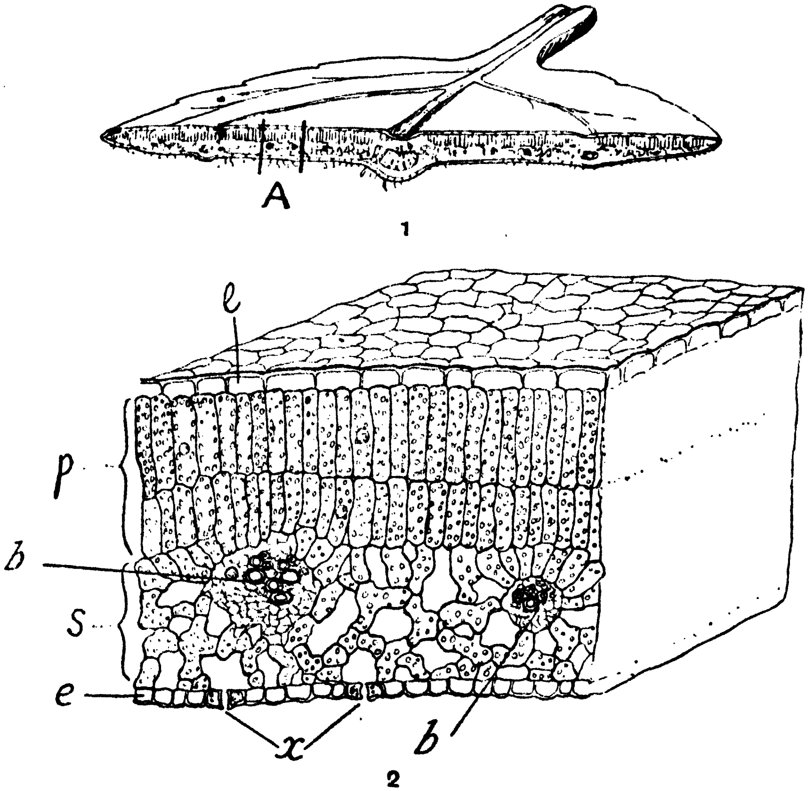

FIG. 1.—Leaf cut across. The portion A in 1 is seen highly magnified in 2. $x$ are the pores or stomates by which the air enters the leaf, passing into the tissue ($s$). The green chloroplasts by which the starch is made are seen in the leaf cells, especially in the tissue ($p$).

(From Percival's *Agricultural Botany*.)

there the carbonic acid gas enters the leaf cells. This it does by dissolving in the water present on the cell walls as the air passes along the passages in the sponge-like tissue of the leaf. In the leaf cells are numbers of little green bodies, called chloroplasts, which by means of the energy obtained from the sunlight turn the carbonic acid into such complex substances as sugar and starch. Further manufacturing processes go on in the plant, largely, it is thought, in the leaves, and the sugar, together with the mineral salts obtained by the roots, are built up into much more complex substances—proteins, &c. These, as well as the sugars and starch, form the true food of plants, just as they are the food of many animals. But it will be seen that a plant gains such food by a very different method from that used by an animal, for they are manufactured within the plant from much simpler bodies that in themselves have no food value. The leaves of the plant are especially concerned in the process—they may, in fact, be regarded as food factories. The raw materials used are the water and mineral salts from the soil and the carbonic acid gas from the air. To carry the comparison further, the machines concerned are chiefly the chloroplasts in the leaf cells, while the power is the energy obtained from the sunlight.

### BREATHING.

There is another process in the life of a green plant that must be considered—it is respiration or breathing. In plants this process, just as vitally important for them as for animals, is not confined to special organs such as lungs, but takes place in all parts of the plant structure. Breathing is a decomposition process, in which the complex substances of the body break down and the waste products are removed, largely by the action of the oxygen gas of the air. An abundant supply of air is as needful for a plant's healthy existence as it is for an animal's. The green plant may be regarded as a machine, the efficient working of which depends upon, not only an adequate supply of raw material for making food, but upon a number of external conditions—temperature, humidity, and sunlight.

Suppose, now, a green plant is grown under dull, damp conditions, such as obtain during what we term muggy weather. Because the humidity of the atmosphere is increased, considerably less water will be given off into the air by evaporation from the leaf cells. The leaves, however, are receiving water all the time from the roots at approximately the same rate, because the conditions in the soil change more slowly than in the air. The result is the leaf cells become swollen with water, and the air spaces between them decreased in size. Less air thus reaches the interior of the leaf, consequently there is less oxygen available. The decomposition of the complex substances involved in breathing goes on all the time, but since there is less oxygen to remove the degeneration products, they tend to accumulate in the living cells. These decomposition products are often of an acid nature, and their accumulation in the tissues reacts harmfully upon the protoplasm. A second effect is that the diminished sunlight affects the process of food manufacture, for the supply of power is cut down. Less food being made, the plant lives upon any that it may have stored within it; stored starch becomes changed into sugars. It may happen that a certain amount of growth is made, but it is not stout, thrifty growth, but feeble and sappy, and the whole plant contains an excess of watery, somewhat acid, sugary sap. The net result of the changed weather conditions is that the whole *tone* of the plant is lowered and its condition enfeebled. It reaches a state in which its power of resistance to disease is diminished.

### THE PARASITE.

So much for the effect of such conditions upon the green plant—the possible host. Consider now, briefly, the fungus—the possible parasite. The fungus is a non-green plant; it cannot manufacture its own food, but absorbs it ready made. It has no need for sunlight as a source of energy or power. A diminished amount of light, so far from being injurious, is a positive advantage, for the most casual observation shows that fungi as a class are not light-seeking organisms. Similarly, the increased humidity of the atmosphere is beneficial to the fungus, which is a very delicate structure, offering little resistance to desiccation, and soon becoming dried up. Atmospheric conditions, then, which react harmfully upon the green plant and lower its vitality, may have a diametrically opposite effect upon the fungus that parasitises it. A change in the weather may often, as every grower knows, lead to the outbreak of an epidemic.

### SPECIALISATION BY FUNGI.

From this, however, it must not be concluded that the atmospheric conditions *produce* the disease, they merely serve to render possible the rapid spread of a trouble which is already there. The spores of the parasitic fungus must be present, and, unfortunately, they are almost ubiquitous. The question naturally arises, why are not fungus diseases more common upon all plants? Why, for instance, do not all plants suffer from the fungus that causes wheat rust, the spores of which are produced in such countless millions? The spores of this fungus will germinate on the leaves of many plants if there be drops of water there, yet the germ tubes will only produce infection of their proper host. This condition suggests the existence of some unconscious attraction on the part of a host plant over its parasite. Experiments have been made upon more than one occasion to determine what may cause this attraction. In the case of some fungi the mere presence of an unusual amount of sugar in the cells of the host appears to be sufficient; but in the case of most well-recognised parasites it appears to be something else, something peculiar to the particular plant attacked. What this something is we do not know. To solve the problem for even one fungus disease would be a great step in advance; but the problem is a difficult one, and calls for the aid of chemists as well as botanists.

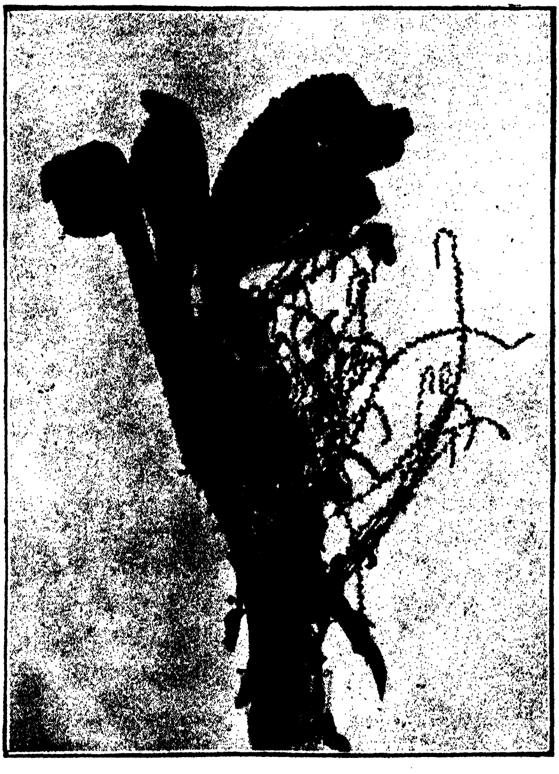

FIG. II.—Stem of "silver beet," showing the abnormality known as fasciation.

Often existing side by side with diseased plants there may be others of the same species quite free from attack. We say one is susceptible and the other immune. This is often strikingly shown by varieties of wheat under rust attack; but it may be observed in many other plants. Behind and beyond the mere conditions of food supply, of climate and of weather, there is something else to be considered, namely, the living plant itself. As Professor Marshall Ward has written, "If I were asked to sum up the most important results of the numerous advances made during the past decade in agriculture and forestry, I should reply—The clearer and wider recognition of the fact that the plant itself is the centre of the subject, and not the soil, climate, season, or other factors of its environment."

### TYPES OF PLANT DISEASE.

The manifestations of disease in plants are very varied; so also are the causes, so far as we know them at present. There are to-day many types of disease known, some of them of considerable economic importance, concerning the causes of which we know little or nothing.

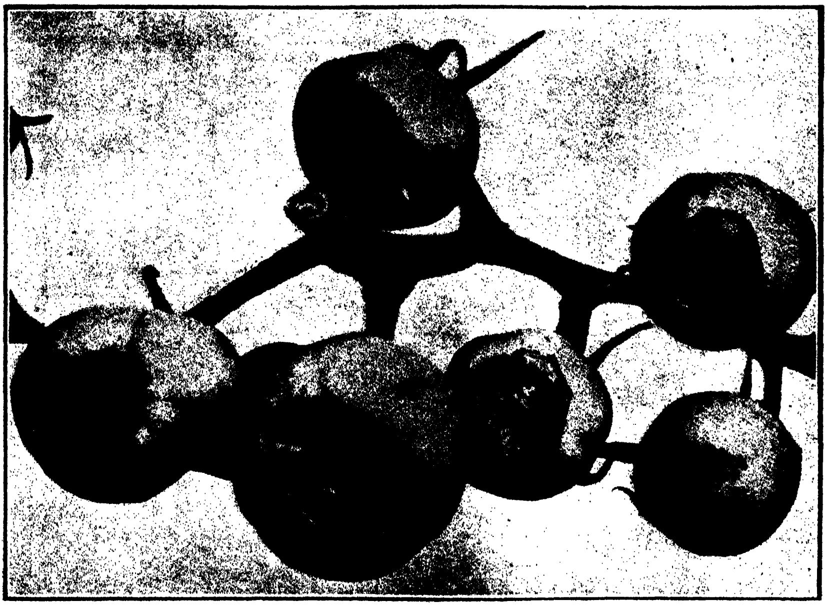

FIG. III.—Blossom-end rot of tomatoes. (From Brooks' *Phyto Pathology*, Vol. IV.)

The great group of plant abnormalities come in this class. Monstrous stems, of which that flattening known as fasciation is an example often to be found in many local gardens, "blindness" of flowers and the like are all due to causes not yet understood. Mal-nutrition, especially over-nutrition, no doubt plays a large part in producing them, but it is unlikely that it is the sole cause. Other maladies are much more like those that we know to be due to some type of parasitic organism, but as yet none has been identified in connection with them. Probably there are few growers who have not at some time or another been troubled by the tomato disease known as "blossom-end rot." The depressed watery-looking area that appears around the remains of the style, and subsequently becomes brownish and leathery, is very familiar. Though in an advanced case of this disease fungi and bacteria may sometimes be present, yet no organism has been identified as the cause of the trouble. This is probably in South Australia our best known plant "disease of unknown origin," the type of disease that has often been miscalled "physiological"—an unhappy term, since all disease is due to physiological derangement. In other countries in which plant pathology has been longer studied several other such diseases of unknown origin exist, and are to be greatly feared, because of the loss they cause, *e.g.*, the "peach yellows" of California. Whether or not these are truly diseases of a plant arising without any casual organism, only continued research can show. There are those who assert that ultimately all plant disease will be shown to be due to some pathogenic organism.

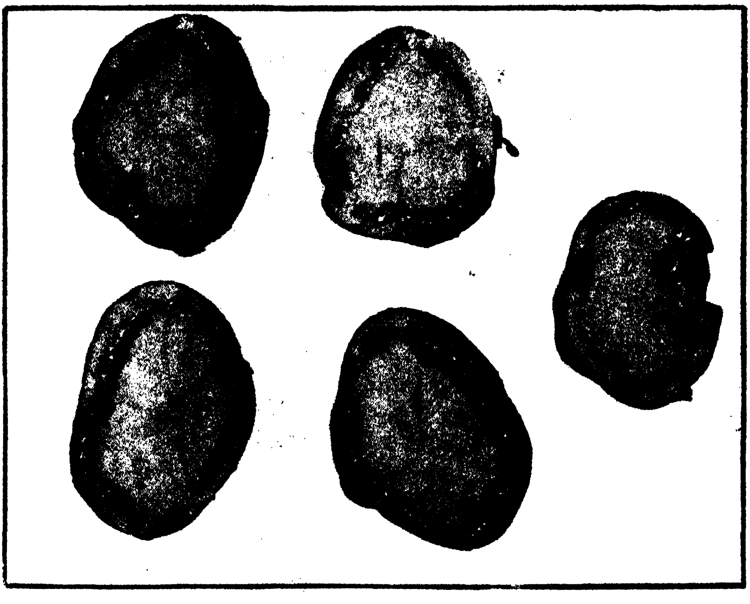

**Fig. iv.—Bacterial rot of potatoes. The bacteria start the rot from the veins found a little distance below the skin of the tuber, thus producting a brownish ring in the flesh.**

### Bacterial Disease.

When we consider the history of bacterial diseases of plants this opinion has some justification. It is less than 40 years since the first bacterial disease of plants was described, and at that time and for many years afterward the correctness of the diagnosis met with much adverse criticism. Now very many such diseases are known, but hitherto few have been found to be of much importance in Australia. A bacteriosis of potatoes, though, occurs in South Australia at times on a scale sufficiently large to cause noteworthy loss.

Other diseases of plants occur caused by plant and animal agency. We shall only deal with the former in these lectures. Though, strictly speaking, diseases caused by animal agency should be considered in any review of plant pathology, in practice they usually form a separate study—economic zoology—a field that in South Australia at present awaits a specialist.

### FUNGUS DISEASES.

Of the plants causing disease of other plants, fungi are, in this State, far the most numerous. It must not be thought, however, that all parasitic fungi show the same degree of specialisation as is shown by the wheat rust fungus. In this case the fungus lives without destroying its host, though often doing serious damage to the yield of the crop. The injury to the infected plant may be considered as affecting it in at least two ways. There is, first, the obvious damage due to the drain upon the plant in having to support an organism living at its expense. But this loss through robbery is only one phase of the injury. A second is that the diseased areas of the plant are seriously impaired in their activity. Not only is growth made markedly less, but the affected areas are less efficient, if not wholly useless, as food-producing structures. This is the nature of the injury in some types of fungus disease. Often, however, the parasitic fungus gives the infected plant a much shorter shrift. Its action is so violent that a rapid destruction of the host takes place. If the fungus be a true parasite, that is, one only able to live upon a living plant, its own life and activity is limited by such rapid destruction of its source of food. We often find, however, that where a rapid destruction of the host takes place the fungus can continue to live for some time after, in a ghoulish fashion, upon the dead structure of its host. Such fungi are not strict parasites, but partially parasitic and partially saprophytic in their mode of living.

It is generally the case that during this saprophytic period of existence resting spores of the fungus are produced. The well-known fungus-producing scab of apples and pears (*Venturia pomi*) forms its perfect stage of spore production from the disease spots on the dead leaves during the winter. Similarly the "brown or ripe rot," caused by *Sclerotinia fryctigena,* found not uncommonly upon peaches, pears, apples, &c., over-winters in the hardened, "mummified" fruit that has been destroyed, only to produce fresh spores next spring. The "takeall" fungus, *Ophiobolus graminis*, does not produce its spores until some time after the death of the wheat plant attacked. Such cases show the necessity for burning all diseased portions of plants, instead of leaving them lying about.

Another point of interest is the differing behaviour of the same fungus upon different parts of the same plant. "Irish blight" of potatoes is produced by a fungus, *Phytophthora infestans*, that may cause a rapid and most destructive rot of the potato tops. On the other hand, often the only noticeable effect is that the tubers show the disease in the form of the well-known rusty brown stains of the flesh. In the tuber the fungus may live for some months, and unless other fungi and bacteria attack it no rot may occur. It may not be until the tuber is planted as "seed" that the fungus grows out into the new shoots, and often produces the spores, which start a fresh attack.

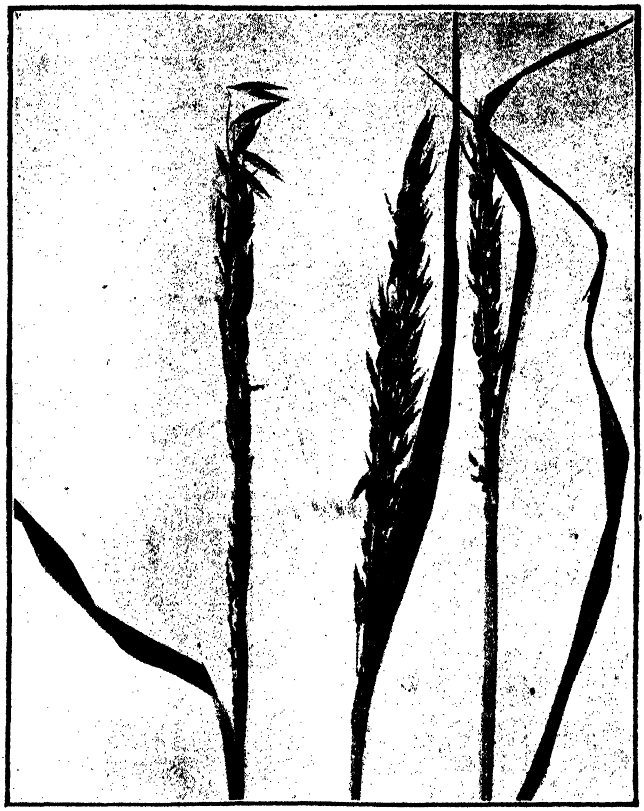

FIG. V.—Heads of oat infected with smut fungus, *Ustilago avenae*.

### SMUT FUNGI.

The "smut" producing fungi are some of the most remarkable of those attacking plants because of the great specialisation of parasitism that they show. All agriculturists are familiar with the appearance of "smutted heads" of oats. On them, instead of grain, one finds little but a quantity of black powder enclosed at first by the outer chaff. This powder consists of the spores of the smut fungus, *Ustilago avenae*. The spores are shed upon the ground and caught in the chaff of healthy grains. They can live dry for some time, but after a rest, when placed in water, they germinate. Upon germination each spore produces a number of conidia, which infect a germinating oat seed. The fungus grows in the tissues of the oat plant, producing little visible

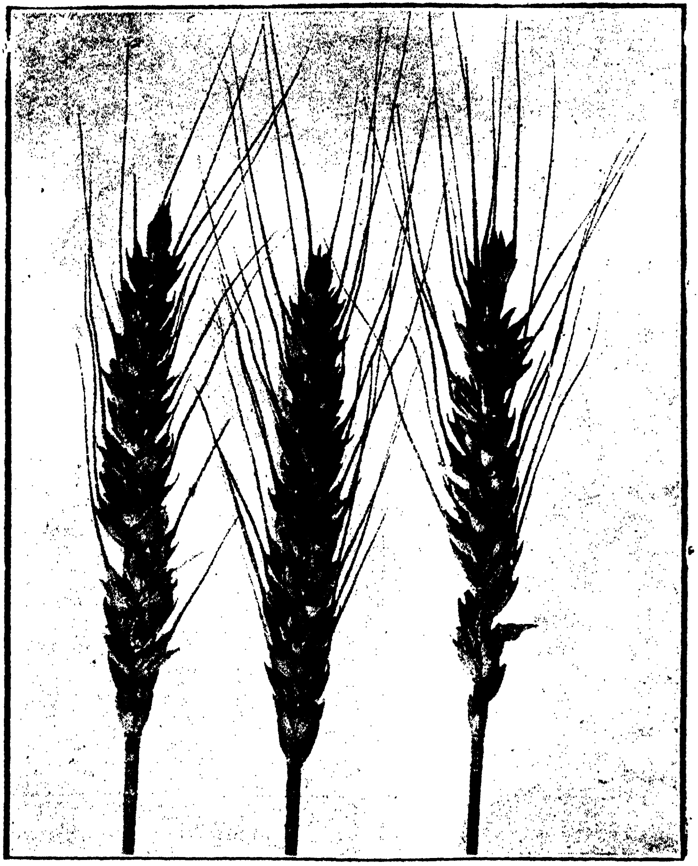

FIG. VI.—Bunt of wheat caused by *Tilletia tritici*. The smut spores remain as compact masses, "bunt balls" within the chaff, and are only freed when the head is broken up.

effect until the flowers are forming. Then it thickly permeates the floral organs, destroying them and producing its own spores. The parasitic fungus here is so beautifully specialised in its parasitism that for months it lives upon its host without seriously impairing the latter's efficiency. After a time, at the period when the host would normally produce its seed and die, the fungus invades the host's productive organs, benefits by the food material accumulating there, and forms its own spores in place of its host's seed. The story of "bunt," *Tilletia tritici*, is essentially the same; here, however, the spores form in compacted masses, and are not shed in the form of powder. In the case of flag-smut of wheat, *Urocystis tritici*, essentially the same series of events happens, but the spores are produced upon the leaves,

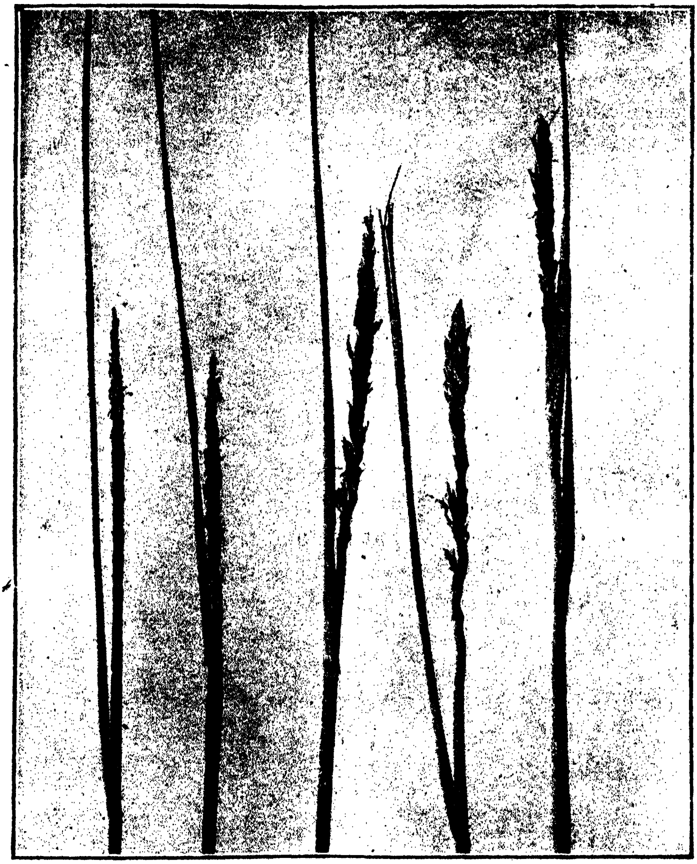

FIG. VII.—Loose smut of wheat caused by *Ustilago tritici*. In the examples on the left the whole of the chaff has been destroyed as well as the grain.

so the host is generally destroyed before the ears are produced. The story of the loose smut of wheat, *Ustilago tritici,* is even more remarkable. Here, again, similar loose masses of blackish spores are formed in place of the grain. Sometimes the whole of the chaff may be destroyed, and the main stalk of an ear alone be left. The loose, powdery spores, however, are shed at the time when the uninfected wheat flowers will be putting out their feathery stigmas to catch the pollen. Some of the smut spores are caught in the stigmas, too, and germinate there. The tube that is put out by the spore grows to the ovary, which it infects. The presence of the fungus, however, does not prevent the grain from setting. Seed is formed, but it is infected seed, and with the young plant next season there grows up the fungus, which, in its turn, forms spores in place of grain. It will be seen that the story is somewhat similar to that of loose smut of oats, but with this difference, the infection takes place at the flowering stage, and the grain produced is already diseased, though it is viable. It is, surely, but a stage further than this in specialisation for the fungus to cease forming spores at all, for it to grow out of the infected seed, live at the expense of its host, then infect the next generation of the host when seeds are formed, and so on. Such extreme cases of perfect parasitism (from the fungus' point of view, if the expression may be allowed) do actually exist. It is questionable, though, whether in such cases the fungus can be considered as producing a disease of its host. The life processes of the two organisms are so balanced that the one can exist without noticeable detriment to the other. Very many examples are known of fungi living in the tissues of higher plants, but producing no disease. The region infested is usually the roots, *e.g.,* many forest trees, orchids, &c., and in these cases the presence of the fungus is a positive advantage to the flowering plant, which in many cases cannot be grown without its partner. But clearly such associations can hardly be considered as pathological.

## SPRAYING FOR CODLIN MOTH.

"The best spray for suppressing codlin moth is arsenate of lead blended at the rate of 1lb. of the paste to 20galls. to 25galls. of soft water, or 40galls. to 50galls. of water to each pound of the powdered form," said the Horticultural Instructor (Mr. G. Quinn), in reply to a correspondent. "The first spraying in each season is applied just after the blossoms fall, a second about 14 days later, and a third a month or six weeks after the second. For late-ripening apples in a badly infected place another spraying is desirable about the end of January."

# CONTAGIOUS ABORTION IN MARES.

Attention has recently been directed to a statement that settlers in the Victorian mallee were suffering loss through the appearance of contagious abortion in mares. It will be remembered that the South Australian Government Veterinary Lecturer (Mr. F. E. Place, B.V.Sc., M.R.C.V.S.) uttered a warning some few weeks ago at Pinnaroo that it was to be feared the trouble might be found in the district; at the same time he pointed out that there was no cause for a scare if farmers would take commonsense precautions when mares slipped foal. The cause of the trouble, Mr. Place explained, is a bacillus, which, like that which produces lockjaw, is very prevalent in almost all districts, but only becomes active for harm under certain climatic and atmospheric conditions which, unfortunately, are those which have been prevailing lately.

The symptoms are those which occur in any case of slipping foal, but in many cases of the contagious disease there is a bloodstained glairy discharge preceding the abortion, possibly not profuse enough to call for much comment, but noticeable when looked for.

The casting of the foal at the seventh or ninth month, and often earlier, is not accompanied by much difficulty on the part of the mare, and in the majority of cases she does not suffer from bad after effects, though the older the foal is the more likely she is to fall off in condition after the occurrence.

As the foal is slipped before the farmer is aware that anything is going to happen, treatment is of little use; but in those cases where the udder springs, and there is swelling under the belly, a dose of a teaspoonful of saltpetre twice a day is advisable for a week, and, for those who prefer it, 10 drops of tr. pulsatilla on the tongue twice a day for a like period.

### PREVENTION.

Prevention is based on the fact that the disease has a definite bacterial cause, and in some countries a preventive vaccine is prepared and used, but in South Australia the scarcity of qualified veterinary surgeons able to apply this practically puts it out of court, for it is not a safe remedy for the amateur to play with.

The ordinary commonsense treatment of in-foal mares, the avoidance of hard mallee scrub feed, must be observed, and when a mare is suspected of being about to abort, strict isolation must be carried out, and the foal and all discharges must be deeply buried after being disinfected with kerosene or other efficient material. Where it is possible, destruction by fire is by far the best.

Other in-foal mares must be kept out of the paddock or yard where the occurrence has happened, for, like cows, they are very curious to investigate the affair, and so become infected themselves, both by means of the nostrils and mouth.

As the after-discharges from the mare remain infective for a considerable time, it is necessary to disinfect the passage, the bearing, and the thighs and tail, and this should be done daily for three days, then once a week for twice more.

The best way of doing this is to make a solution of perchloride of mercury of the strength of 1-1250, and this is conveniently done by dissolving a Burroughs, Wellcome tabloid in a pint of warm water in an enamel or earthenware vessel (not metal), and swabbing the parts with it; if a syringe is used it must not be metal.

The hands should be thoroughly cleansed before touching other mares, and carelessness in leaving discharges or infective material about must be sternly rebuked.

The mare that has aborted should not be put to the stallion until she has been thoroughly disinfected, and it is as well to disinfect her internally as well as locally. This may be done by giving her an ounce or two of hyposulphite of soda daily for a week, or if she will take it in her food, as many will, a dram of pure carbolic acid in a teacup of water once a day for a week.

It must be remembered that a mare may carry a foal to full time, although at the same time a carrier of the germs which may prove abortive to others, so that she may prove a source of danger, and should be carefully watched and disinfected if she shows signs of any discharge.

The majority of infected mares also show granular roughenings on the mucous lining of the passage, and should this be observed they, too, should be treated.

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# SEED IMPORTED FROM ABROAD INTO SOUTH AUSTRALIA.

## RESULTS OF PURITY TESTS DURING THE YEAR ENDED JUNE 30TH, 1916.

[By H. W. ANDREW, Botanical Assistant and Quarantine Officer for Plants, South Australia.]

Eighty years ago, on the foundation of the Colony of South Australia, the number of agricultural and garden weeds could have been counted on the fingers of both hands. Among these should be included the native weeds *Acaena sanguisorba, Vahl.* (burr weed), *Acaena ovina, Cunn.* (sheep's burr), the burrs of which are so troublesome to picknickers to the Mount Lofty Ranges in the summer months, and one or two kinds of *Loranthus* (mistletoes), whose sticky berries are still occasionally transferred by birds to the fruit trees of the fig, mulberry, etc., where they germinate and grow into parasitic plants. Since that time over 400 introduced plants have established themselves more or less in this State (described in the "Naturalised Flora of South Australia," or recorded in the transactions of the Royal Society of South Australia, by Mr. J. M. Black). Owing to their obtrusive and importunate character the majority of these plants may be rightly stamped as weeds. There is no doubt whatever that the chief medium through which new weed pests have been introduced into various countries is by way of agricultural and other seed. The principal objects of the following notes are, firstly, to demonstrate the frequency and nature of the occurrence of weed seeds in 396 separate lots of seeds from abroad; secondly, to endeavor to show the farmer, gardener, and seedsman the importance before ordering of always stipulating for pure seed, and carefully examining all seeds before planting; this examination should be done preferably by someone accustomed to such work, who has the necessary experience and equipment (pocket lens, specimen weed seeds, &c.); thirdly, to draw attention generally to the need for the systematic examination of bird and other seed not necessarily required for sowing purposes.

### Frequency of Occurrence of Weed Seeds.

Table I. sets forth in detail the botanical and common name of 25 kinds of weed pests proclaimed under the Federal Quarantine Act, and about 40 other weeds, &c., found in certain of 396 lots of seed imported from extra-Australian sources and examined for weed seed and other impurities during the year under review.

The kind of seed and number of consignments (or samples) in which the respective weed or foreign seeds were found are also shown alongside the total number of the respective kinds of seed consignments actually examined during the year. Thus, to illustrate by example, on turning to the first part of Table I., devoted to the occurrence of "noxious weeds," it will be found that seeds of *Brassica Sinapistrum* (charlock or wild mustard) were found in one consignment of wheat out of three examined, in one lot of cultivated oat out of eight, in 14 lots of canary seed out of 16, and in four lots of linseed out of five. From this it may therefore be seen that in the case of charlock seeds occurred in 20 consignments of imported seed, and so on.

### OBJECTS OF PROCLAIMING "WEED PESTS" UNDER FEDERAL QUARANTINE ACT.

In any consideration of the work being conducted along these lines it must be realised at the outset that the main purpose of proclaiming certain plants under the Federal Quarantine Act to be "weed pests," is to absolutely prohibit the introduction into any State of any noxious weed new to the country, and further to restrict the importation of others in consignments of seed from abroad. Consequently the significance to be attached to the presence of the different kinds of weed pests varies considerably, chiefly according to the fact whether the weed is already established in the country or not. In all cases, however, even in the case of less pernicious weeds like goosefoot or fat hen, these seeds mixed with seeds intended for sowing by the farmer and the gardener constitute not only a varying percentage of foreign material for which they pay at the same rate as for the pure seed, but add insult to injury in that the planter is befooled in sowing what he may consider to be the correct proportion of pure seed, and moreover, continue perhaps for years to make big inroads upon his time and purse in suppressing them.

In this connection it may be appropriately pointed out that whatever the virtues of a weed, for instance, such as *Chenopodium album* (goosefoot) may be under certain circumstances, it will scarcely be argued that 17,648 seeds per lb. (approximately) of this plant (apart from other weeds) in a consignment of 14lbs. of Early Horn carrot received here in February last should have been admitted without being cleaned or destroyed (see Table II.), such plants among crops, surely will find no apologist.

### IMPURITIES UNDER THE FEDERAL COMMERCE ACT.

For dealing with other weed seeds, dirt, and foreign matter not proclaimed under the Federal Quarantine Act which sometimes occur in large quantities in seed importations, ample powers are given under the Federal Commerce Act to allow such impurities to be freed from consignments where practicable, or otherwise treated. This Act provides that all seeds imported from countries outside Australia shall be (*a*) true to name, (*b*) sound, (*c*) clean, and (*d*) new. The first three conditions are tested at this office when examining samples under the Quarantine Act for noxious weeds.

### FALSE DESCRIPTION OF CONSIGNMENTS OF SEED.

Concerning section (*a*) genuineness of seed (correct trade description) one consignment of seed described as Sheep's Burnet (*Poterium Sanguisorba*) after close examination revealed that nearly one quarter of the consignment by weight was made up of sainfoin (*Onobrychis *sativa*). These two "seeds" are much the same color and size, and on a casual examination look much alike, and the plants themselves are very similar in vegetative characters, the leaves of both being pinnate, though the burnet has serrate margins, so that when growing together it is not every farmer who would recognise the fact he had two separate plants, burnet belonging to the rose family and sainfoin to the pea family.

### INSECT AND DISEASE-INFESTED SEED.

Section (*b*). This involves the testing of seeds in relation to freedom from insects and disease, and examinations revealed the presence of dead weevils (*Bruchus sp.*) in a consignment of Egyptian clover, and live bread and biscuit beetles (*Anobium panicum*) in 12 bags of coriander seeds, also various mites, chiefly found in Brassica seeds. *Ustilago avenae* (*Pers.*) *Jens*, and *U. hordei* were found in oats and barley respectively.

Work under section (*c*), including the testing of consignments for seeds other than those mentioned in the Trades Description, is detailed in the latter part of Table I., and also included in Tables II. and III.

### GERMINATION TESTS.

Section (*d*), which covers a considerable amount of work in testing the newness or vitality of seeds intended for sowing, is not dealt with in these notes.

### BIRD SEED AND WEED DISSEMINATION.

An outstanding feature of this branch of the year's work is the surprisingly large number of weed seeds found in bird and other seed not necessarily imported for sowing purposes. Reference to Tables I. and II. will show the occurrence of these in canary seed, linseed, &c., in 16 and five consignments respectively examined systematically since last November (not the whole year). These particulars should be of interest to the consumer, as well as the primary producer, as tending to show the effect of bringing into operation the clauses of the Commerce Act, providing for the restriction of food adulteration, etc.

Apart from foreign seeds it was found that three consignments of linseed aggregating 98 bags, chiefly from Japan; and 58 bags of canary seed from Morocco, contained large quantities of dirt and other refuse (see Table II.).

That bird seed may be a fertile source of distributing weeds may be reasonably expected. Complete and painstaking experiments have been conducted in various parts of the world which have demonstrated in some cases that the germination of certain seeds is even accelerated by passing through the digestive tracts of animals.

It is recognised by naturalists generally that birds in this way are great distributors of plants. There can be little doubt that bird droppings are largely responsible for the frequent clumps of *Lycium campanulatum* (African boxthorn) under eucalyptus and other trees in the plains of Adelaide and elsewhere. Possibly the nutlets or "seeds" of "Patterson's curse" and the small, round, partial pods of the turnip weed containing a single seed (as found in lots of commercial seeds) are not even swallowed by canaries and other small birds, but simply discarded. In any case, whether eaten or not, many uninjured weed seeds, judging by their repeated occurrence in lots of canary seed, &c., ranging in quantity up to 174 bags, must be thrown out with the refuse from cages, &c., and so providing fresh centres of weed distribution. In particular canary seed from Morocco revealed the presence of seeds of Patterson's curse or Salvation Jane in three consignments, charlock in 14, turnip weed nine out of 16 consignments examined.

There appears to be a prevailing impression throughout Australia that *Echium plantagineum* (including E. *violaceum*) has possibly spread generally as a result of this plant escaping from the garden of a Mr. Patterson, near Albury, New South Wales. There is no doubt this and other pests have become distributed over wide areas in this way., but in view of the frequency of the occurrence of Patterson's curse in lots of canary and agricultural seed ranging up to 174 bags in the consignment, it can hardly be doubted that this plant and a large number of others have been disseminated mainly by way of impure lots of seed.

### MEDITERRANEAN WEEDS.

A large number of our naturalised plants originated from the Mediterranean region, chiefly European and North African coasts (over 90 in South Australia), and in respect to this well-known fact, attention is drawn to the occurrence of "seeds" of *Rapistrum rugosum* (turnip weed), a proclaimed weed of Italy, and which has occasioned so much trouble in certain farming districts here, among seeds of *Poterium Sanguisorba* (sheep's burnet) from France, and in nine consignments of canary seed from Morocco.

### COMMONWEALTH GRADING MACHINE.

Prior to February, 1916, dirty consignments of seed, when practicable, were sent to various firms to be cleaned by grading machines, but for various reasons, including the better supervision of the seed so placed under bond, the Commonwealth Quarantine Department, at the instance of the Chief Quarantine Officer for Plants, S.A. (Mr. George Quinn), authorised the purchase of a seed grader, and goods are now treated for the actual cost of the labor, &c., involved, in the Quarantine Fumigation Depot, at Port Adelaide

### TABLE I.

| NOXIOUS WEEDS (Under Federal Quarantine Act). | | NAME OF IMPORTED SEED in which Weed Seeds were found. | | No. of Samples in which Weed Seeds were found. | No. of Samples Examined. |
|---|---|---|---|---|---|
| Botanical Name. | Common Name. | Botanical Name. | Common Name. | | |
| *Agrostemma Githago*, L. (*Lychnis Githago*) | Purple Corn Cockle | *Poterium Sanguisorba*, L. | Sheep's Burnet | 1 | 1 |
| | | *Linum usitatissimum*, L. | Linseed | 2 | 5 |
| *Amarantus* sp. | — | *Andropogon Sorghum*, Brot. | Sudan Grass | 1 | 1 |
| *Anthemis Cotula*, L. | Stinking Mayweed | *Eragrostis abyssinica*, Link. | Teff Grass | 1 | 1 |
| | | *Avena sativa*, L. | Cultivated Oat | 1 | 8 |
| | | *Linum usitatissimum*, L. | Linseed | 2 | 5 |
| *Avena fatua*, L | Wild Oat | *Triticum sativum*, Lam. (*T. vulgare*) | Wheat | 2 | 3 |
| | | *Avena sativa*, L. | Cultivated Oat | 2 | 8 |
| *Brassica Sinapistrum*, L. | Charlock, Wild Mustard | *Triticum sativum*, Lam. | Wheat | 1 | 3 |
| | | *Avena sativa*, L. | Cultivated Oat | 1 | 8 |
| | | *Phalaris canariensis*, L. | Canary Grass | 14 | 16 |
| | | *Linum usitatissimum*, L. | Linseed | 4 | 5 |
| *Centaurea* sp. | Thistle sp. | *Phalaris canariensis*, L. | Canary Grass | 3 | 16 |
| | | *Avena sativa*, L. | Cultivated Oat | 1 | 8 |
| | | *Linum usitatissimum*, L. | Linseed | 1 | 5 |
| | | *Medicago sativa*, L. | Lucerne | 1 | 3 |
| | | *Allium Cepa*, L. | Onion | 1 | 11 |
| *Centaurea melitensis*, L. | Cockspur (Maltese) | *Phalaris canariensis*, L. | Canary Grass | 6 | 16 |
| | | *Linum usitatissimum*, L. | Linseed | 1 | 5 |
| *Cerastium vulgatum*, L. (*C. glomeratum*) | Broad-leaved Mouse-ear Chickweed | *Poa trivialis*, L. | Rough Stalked Meadow Gr. | 1 | 2 |
| | | *Poa pratensis*, L. | Kentucky Blue Grass | 1 | 5 |
| *Chenopodium album*, L. | Goosefoot, Fat Hen | *Petroselinum sativum*, Hffm. | Parsley | 1 | 3 |
| | | *Avena sativa*, L. | Cultivated Oat | 1 | 8 |
| | | *Daucus Carota*, L. | Carrot | 4 | 12 |
| | | *Hordeum sativum*, Jessen | Barley | 1 | 1 |
| | | *Lepidium sativum*, L. | Cress | 2 | 2 |
| | | *Triticum sativum*, Lam. | Wheat | 1 | 3 |
| | | *Sinapis alba*, L. | White Mustard | 1 | 4 |
| | | *Brassica Rapa*, L. | Turnip | 1 | 22 |
| | | *Brassica nigra* (L.) Koch | Black Mustard | 1 | 2 |
| | | *Achillea Millefolium*, L. | Yarrow | 1 | 1 |
| | | *Linum usitatissimum*, L. | Linseed | 1 | 5 |
| | | *Cuminum Cyminum*, L. | Cumin | 1 | 1 |

| | | | | | |
|---|---|---|---|---|---|
| ***Convolvulus arvensis*, L.** | **Lesser Bindweed** | ***Phalaris canariensis*, L.** | **Canary Grass** | 4 | 16 |
| | | ***Beta vulgaris*, L.** | **Red Beet** | 4 | 12 |
| ***Cuscuta epilinum*, Weihe** | **Flax Dodder** | ***Linum usitatissimum*, L.** | **Linseed** | 1 | 5 |
| ***Echium plantagineum*, L.** | **Patterson's Curse** | ***Hedysarum coronarium*, L.** | **Sulla** | 1 | 1 |
| **(incl. *E. violaceum*)** | **Salvation Jane** | ***Trifolium pratense*, L.** | **Cow Grass** | 1 | 1 |
| | | ***Phalaris canariensis*, L.** | **Canary Grass** | 3 | 16 |
| | | ***Beta vulgaris*, L.** | **Mangel** | 1 | 10 |
| ***Galium* sp.** | Cleavers, Goose Grass | ***Raphanus sativus*, L.** | **Radish** | 8 | 25 |
| | | *Sinapis alba*, L. | White Mustard | 1 | 4 |
| | | *Phalaris canariensis*, L. | Canary Grass | 1 | 16 |
| | | *Vicia* sp. | Tare | 2 | 2 |
| | | *Spinacia oleracea*, L. | Spinach | 2 | 5 |
| | | *Beta vulgaris*, L. | Red Beet | 5 | 12 |
| | | *Brassica Napus*, L. | Rape | 3 | 12 |
| | | *Brassica campestris*, L. | Swede Turnip | 1 | 10 |
| | | *Poterium Sanguisorba*, L. | Sheep's Burnet | 1 | 1 |
| | | *Linum usitatissimum*, L. | Linseed | 3 | 5 |
| ***Lychnis Githago*** (see *Agrostemma* ***Githago*, L.**) | | | | | |
| ***Malva* sp.** | Mallow | *Brassica nigra* (L.) Koch | Black Mustard | 1 | 2 |
| | | *Phalaris canariensis*, L. | Canary Grass | 1 | 16 |
| ***Polygonum* sp.** | — | *Panicum Crus-galli*, L. | Japanese Millet | 3 | 3 |
| | | *Raphanus sativus*, L. | Radish | 1 | 25 |
| | | *Linum usitatissimum*, L. | Linseed | 3 | 5 |
| | | *Sinapis alba*, L. | White Mustard | 1 | 4 |
| | | *Spinacia oleracea*, L. | Spinach | 1 | 5 |
| | | *Lepidium sativum*, L. | Cress | 2 | 2 |
| | | *Beta vulgaris*, L. | Red Beet | 2 | 12 |
| *Polygonum aviculare*, L. | Knot Weed, Hog Weed, Wire Weed | *Avena sativa*, L. | Cultivated Oat | 1 | 8 |
| | | *Raphanus sativus*, L. | Radish | 1 | 25 |
| | | *Daucus Carota*, L. | Carrot | 2 | 12 |
| | | *Phalaris canariensis*, L. | Canary Grass | 1 | 16 |
| | | *Medicago sativa*, L. | Lucerne | 2 | 3 |
| | | *Beta vulgaris*, L. | Red Beet | 1 | 12 |
| *Polygonum Convolvulus*, L. | Black Bindweed | *Spinacia oleracea*, L. | Spinach | 4 | 5 |
| | | *Brassica Napus*, L. | Rape | 1 | 12 |
| | | *Sinapis alba*, L. | White Mustard | 1 | 4 |
| | | *Daucus Carota*, L. | Carrot | 2 | 12 |
| | | *Panicum* spp. | Millets | 1 | 9 |
| | | *Linum usitatissimum*, L. | Linseed | 3 | 5 |
| | | *Raphanus sativus*, L. | Radish | 4 | 25 |
| | | *Beta vulgaris*, L. | Mangel | 3 | 10 |
| | | ***Triticum sativum*, Lam.** | **Wheat** | 1 | 3 |
| | | ***Beta vulgaris*, L.** | **Red Beet** | 8 | 12 |
| | | ***Phalaris canariensis*, L.** | **Canary Grass** | 3 | 16 |

TABLE I.—*continued.*

| NOXIOUS WEEDS (Under Federal Quarantine Act). | | NAME OF IMPORTED SEED in which Weed Seeds were found. | | No. of Samples in which Weed Seeds were found. | No. of Samples Examined. |
|---|---|---|---|---|---|
| Botanical Name. | Common Name. | Botanical Name. | Common Name. | | |
| ***Rumex*** **sp.** | Dock | *Poa pratensis*, L. | Kentucky Blue Grass | 2 | 5 |
| | | *Phalaris canariensis*, L. | Canary Grass | 7 | 16 |
| | | *Daucus Carota*, L. | Carrot | 1 | 12 |
| ***Rumex Acetosella*, L.** | Sorrel Weed (Sheep Sorrel) | *Avena sativa*, L. | Cultivated Oat | 1 | 8 |
| | | *Poa pratensis*, L. | Kentucky Blue Grass | 1 | 5 |
| | | *Festuca* spp. | Fescue Grasses | 3 | 3 |
| | | *Trifolium hybridum*, L. | Alsike Clover | 1 | 1 |
| ***Rumex crispus*, L.** | Curled Dock | *Trifolium* sp. | Clover | 1 | 2 |
| | | *Brassica oleracea*, L. | Kale | 1 | 4 |
| | | *Poa pratensis*, L. | Kentucky Blue Grass | 1 | 5 |
| | | *Linum usitatissimum*, L. | Linseed | 1 | 5 |
| | | *Phalaris canariensis*, L. | Canary Grass | 7 | 16 |
| | | *Trifolium alexandrinum*, L. | Berseem | 1 | 1 |
| ***Sida*** **sp.** | — | *Lespedeza striata*, Hook *et* Arn. | Japanese Clover | 1 | 1 |
| ***Saponaria Vaccaria*, L.** | Bladder or Cow Soapwort | *Linum usitatissimum*, L. | Linseed | 2 | 16 |
| **(*Vaccaria segetalis*)** | (Nancy) | *Triticum sativum*, Lam. | Wheat | 1 | 3 |
| ***Silene*** **sp.** | Catchfly | *Brassica Napus*, L. | Rape | 2 | 12 |
| | | *Linum usitatissimum*, L. | Linseed | 1 | 5 |
| | | *Phalaris canariensis*, L. | Canary Grass | 3 | 16 |
| | | *Lepidium sativum*, L. | Cress | 1 | 2 |
| ***Silene gallica*, L.** | French Catchfly | *Holcus lanatus*, L. | Yorkshire Fog | 2 | 2 |
| | | *Achillea Millefolium*, L. | Yarrow | 1 | 1 |
| | | *Medicago lupulina*, L. | Trefoil | 1 | 1 |
| | | *Trifolium hybridum*, L. | Alsike Clover | 1 | 1 |
| | | *Linum usitatissimum*, L. | Linseed | 1 | 5 |
| ***Sinapis arvensis*, L. (see *Brassica Sinapistrum*)** | Charlock (Wild Mustard) | — | — | — | — |
| ***Spergula arvensis*, L.** | Corn Spurry | *Linum usitatissimum*, L. | Linseed | 3 | 5 |
| | | *Avena sativa*, L. | Cultivated Oat | 1 | 8 |
| ***Stellaria media*** **(L.) Vill.** | Chickweed | *Linum usitatissimum*, L. | Linseed | 2 | 5 |
| | | *Holcus lanatus*, L. | Yorkshire Fog | 1 | 2 |
| | | *Achillea Millefolium*, L. | Yarrow | 1 | 1 |
| | | *Lepidium sativum*, L. | Cress | 2 | 2 |
| | | *Brassica Rapa*, L. | Turnip | 3 | 22 |

TABLE I.—*continued.*

| Other Weeds, Etc. | | Name of Imported Seed in which Weed Seeds were found. | | No. of Samples in which Foreign Seeds were found. | No. of Samples Examined. |
|---|---|---|---|---|---|
| Botanical Name. | Common Name. | Botanical Name. | Common Name. | | |
| ***Ambrosia*** **sp.** | Ragweed sp. | *Lespedeza striata*, Hook *et* Arn. | Japanese Clover | 1 | 1 |
| ***Ambrosia artemisiaefolia*, DC.** | Ragweed | *Panicum Crus-galli*, L. | Japanese Millet | 1 | 3 |
| ***Anagallis arvensis*, L.** | Pimpernel | *Holcus lanatus*, L. | Fog Grass, Yorkshire Fog | 1 | 2 |
| | | *Daucus Carota*, L. | Carrot | 1 | 12 |
| ***Anthoxanthum odoratum*, L.** | Sweet Vernal Grass | *Arrhenatherum elatius* (L.) Beauv. | Tall Oat Grass | 1 | 1 |
| ***Bupleurum*** **sp.** | — | *Phalaris canariensis*, L. | Canary Grass | 3 | 16 |
| ***Cichorium Intybus*, L.** | Chicory | *Trifolium* sp. | Clover | 1 | 2 |
| | | *Trifolium pratense*, L. | Cow Grass | 1 | 1 |
| | | *Trifolium alexandrinum*, L. | Berseem | 1 | 1 |
| | | *Medicago sativa*, L. | Lucerne | 1 | 3 |
| ***Crepis capillaris*, Wallr.** | Hawkweed | *Holcus lanatus*, L. | Yorkshire Fog Grass | 2 | 2 |
| | | *Achillea Millefolium*, L. | Yarrow | 1 | 1 |
| ***Fagopyrum*** **sp.** | Buckwheat | *Cannabis sativa*, L. | Hemp | 3 | 9 |
| | | *Panicum* spp. | Millets | 2 | 9 |
| ***Geranium dissectum*, L.** | Cranesbill | *Medicago lupulina*, L. | Trefoil (yellow) | 1 | 1 |
| | | *Brassica Rapa*, L. | Turnip | 1 | 22 |
| ***Hypochaeris radicata*, L.** | Rooted Cat's Ear | *Festuca* spp. | Fescue Grasses | 3 | 3 |
| | | *Dactylis glomerata*, L. | Cocksfoot or Orchard Grass | 1 | 1 |
| ***Lolium (rigidum*, Gaud ?)** | — | *Linum usitatissimum*, L. | Linseed | 4 | 5 |
| | | *Phalaris canariensis*, L. | Canary Grass | 3 | 16 |
| ***Lolium temulentum*, L.** | Darnel, Drake | *Phalaris canariensis*, L. | Canary Grass | 15 | 16 |
| | | ***Linum usitatissimum*** | Linseed | 2 | 5 |
| | | ***Brassica Napus*, L.** | Rape | 1 | 12 |
| ***Lychnis*** **sp.** | White Cockle (?) | ***Medicago sativa*, L.** | Lucerne | 1 | 3 |
| | | ***Poa pratensis*, L.** | Kentucky Blue Grass | 1 | 5 |
| | | ***Medicago lupulina*, L.** | Trefoil | 1 | 1 |
| ***Matricaria inodora*, L.** | Mayweed | ***Poa trivialis*, L.** | Rough-stalked Meadow Gr. | 1 | 2 |
| ***Medicago denticulata*, Willd. (*M. hispida*, var. *denticulata*)** | Toothed Medic, Burr Clover | ***Beta vulgaris*, L.** | Red Beet | 1 | 12 |
| | | ***Daucus Carota*, L.** | Carrot | 1 | 12 |
| ***Medicago lupulina*, L.** | Black Medic | ***Brassica Napus*, L.** | Rape | 1 | 12 |
| | | ***Poterium Sanguisorba*, L.** | Sheep's Burnet | 1 | 1 |
| ***Neslia paniculata* (L.), Desv.** | Ball Mustard | ***Linum usitatissimum*, L.** | Linseed | 1 | 5 |
| ***Onobrychis sativa*, Lam. (*O. viciaefolia*)** | Sainfoin | ***Poterium Sanguisorba*, L.** | Sheep's Burnet | 1 | 1 |

TABLE I. - *continued.*

| OTHER WEEDS, ETC. | | NAME OF IMPORTED SEED in which Weed Seeds were found. | | No. of Samples in which Foreign Seeds were found. | No. of Samples Examined. |
|---|---|---|---|---|---|
| Botanical Name. | Common Name. | Botanical Name. | Common Name. | | |
| *Phalaris* sp. | — | *Phalaris canariensis*, L. | Canary Grass | 5 | 16 |
| *Plantago lanceolata*, L. | Ribgrass | *Medicago sativa*, L. | Lucerne | 3 | 3 |
| | | *Trifolium pratense*, L. | Cow Grass | 1 | 1 |
| | | *Medicago lupulina*, L. | Trefoil | 1 | 1 |
| | | *Lolium* sp. | Rye Grass | 1 | 2 |
| | | *Daucus Carota*, L. | Carrot | 1 | 12 |
| | | *Cuminum Cyminum*, L. | Cumin | 1 | 1 |
| *Rapistrum rugosum* (L.) All. | Turnip Weed | *Phalaris canariensis*, L. | Canary Grass | 9 | 16 |
| | | *Linum usitatissimum*, L. | Linseed | 1 | 5 |
| | | *Poterium Sanguisorba*, L. | Sheep's Burnet | 1 | 1 |
| | | *Beta vulgaris*, L. | Red Beet | 1 | 12 |
| *Setaria glauca*, Beauv. | Yellow Foxtail | *Panicum* spp. | Millets | 4 | 9 |
| *Setaria viridis*, Beauv. | Green Foxtail | *Panicum*, spp. | Millets | 4 | 9 |
| | | *Linum usitatissimum*, L. | Linseed | 2 | 5 |
| | | *Cannabis sativa*, L. | Hemp | 2 | 9 |
| *Sherardia arvensis*, L. | Madder | *Medicago lupulina*, L. | Trefoil | 1 | 1 |
| *Sonchus oleraceus*, L. | Sow Thistle | *Achillea Millefolium*, L. | Yarrow | 1 | 1 |
| *Sorghum* sp. | — | *Panicum* sp. | Millet | 1 | 9 |
| | | *Phalaris canariensis*, L. | Canary Grass | 1 | 16 |
| *Taraxacum officinale* | Common Dandelion (English Dandelion) | *Linum usitatissimum*, L. | Linseed | 1 | 5 |
| *Trifolium* spp. | Clovers | *Hedysarum coronarium*, L. | Sulla | 1 | 1 |
| | | *Medicago sativa*, L. | Lucerne | 1 | 3 |
| | | *Holcus lanatus*, L. | Yorkshire Fog | 1 | 2 |
| | | *Phleum pratense*, L. | Timothy | 1 | 1 |
| *Triticum sativum*, Lam. | Wheat | *Phalaris canariensis*, L. | Canary Grass | 12 | 16 |
| *Vicia* sp. | — | *Pastinaca sativa*, L. | Parsnip | 1 | 1 |
| Unknown spp. | — | *Phalaris canariensis*, L. | Canary Grass | 9 | 16 |
| | | *Linum usitatissimum*, L. | Linseed | 4 | 5 |
| | | *Cannabis sativa*, L. | Hemp | 2 | 9 |
| | | *Triticum sativum*, Lam. | Wheat | 1 | 3 |
| | | *Trifolium alexandrinum*, L. | Egyptian Clover | 1 | 1 |
| | | *Poa pratensis*, L. | Kentucky Blue Grass | 2 | 5 |
| | | *Lespedeza striata*, Hook *et* Arn. | Japanese Clover | 1 | 1 |

TABLE II.—*Particulars of Consignments of Imported Seed Cleaned or Destroyed on Account of Presence of Impurities under the Federal Quarantine and Commerce Acts (Year ended June 30th, 1916).*

| Sample No. | Description of Seed Imported. | Quantity | Kind of Weed and Other Seeds Contained. | No. per Oz. | Approximate No. per Pound. | Weed Seeds and Rubbish After Cleaning. Lbs. |
|---|---|---|---|---|---|---|
| 184 | *Andropogon Sorghum* (Sudan Grass) From U.S.A. | 7lbs. | *Amarantus retroflexus* (Pigweed, Redroot) | 43 | 688 | — |
| 191 | *Lespedeza striata** (Japanese Clover) From U.S.A. | 7lbs. | *Ambrosia* sp. (Ragweed sp.).. | 815 | 13,040 | — |
| | | | *Setaria* sp. ................ | 24 | 384 | — |
| | | | *Sida* sp. ................... | 2 | 32 | — |
| | | | Unknown sp. ............. | 9 | 144 | — |
| | | | | | 13 600 | |
| 192 | *Panicum Crus-galli** (Japanese Millet) From U.S.A. | 560lbs. | *Ambrosia artemisiæfolia* (Ragweed) | 276 | 4,416 | — |
| | | | *Setaria glauca* (Yellow Foxtail) | 772 | 12,352 | — |
| | | | *Polygonum Persicaria* (?) .... | 48 | 768 | — |
| | | | *Polygonum* sp. ............ | 9 | 144 | — |
| | | | Unknown sp. ............. | 4 | 64 | — |
| | | | | | 17,744 | |
| 235 | *Linum usitatissimum* (Linseed) From Japan | 70 bags | *Polygonum Convolvulus* (Black Bindweed) | 52 | 832 | 500 |
| | | | *Stellaria media* (Chickweed)... | 21 | 336 | — |
| | | | *Lolium* (*irgidum ?*) .......... | 30 | 480 | — |
| | | | *Spergula arvensis* (Corn Spurry) | 4 | 64 | — |
| | | | *Galium* sp. (Cleavers) ....... | 8 | 128 | — |
| | | | Others .................... | 8 | 128 | — |
| | | | | | 1,968 | |
| 261 | Linseed ........... From Japan | 15 bags | *Brassica Sinapistrum* (Charlock) | 218 | 3,488 | 300 |
| | | | *Anthemis Cotula* (Stinking Mayweed) | 49 | 784 | — |
| | | | *Lolium temulentum* (Darnel, Drake) | 5 | 80 | — |
| | | | *L. rigidum* (?) ............. | 200 | 3,200 | — |
| | | | *Setaria viridis* (Green Foxtail) | 9 | 144 | — |
| | | | *Neslia paniculata* (Ball Mustard) | 8 | 128 | — |
| | | | *Rumex* sp. (Dock) .......... | 8 | 128 | — |
| | | | *Chenopodium album* (Fat Hen) | 5 | 80 | — |
| | | | Others .................... | 5 | 80 | — |
| | | | | | 8,112 | |
| 337 | *Daucus Carota* (Early Horn Carrot) From New Zealand | 14lbs. | *Chenopodium album* ......... | 1,103 | 17,648 | 3½ |
| | | | *Polygonum Convolvulus* ...... | 19 | 304 | — |
| | | | *Rumex* sp. (Dock) .......... | 12 | 192 | — |
| | | | Others .................... | 3 | 48 | — |
| | | | | | 18,192 | |

**Table II.**—*Particulars of Consignments of Imported Seed Cleaned or Destroyed on Account of Presence of Impurities under the Federal Quarantine and Commerce Acts (Year ended June 30th, 1916)*—contd.

| Sample No. | Description of Seed Imported. | Quantity | Kind of Weed and Other Seeds Contained. | No. per Oz. | Approximate No. per Pound. | Weed Seeds and Rubbish After Cleaning. |
|---|---|---|---|---|---|---|
| | | | | | | Lbs. |
| 356 | *Beta vulgaris* (Johnson's Dark-leaved Red Beet)<br>From England | 112lbs. | *Convolvulus arvensis* (Lesser Bindweed) | 20 | 320 | 29 |
| | | | *Polygonum Convolvulus* ...... | 6 | 96 | — |
| | | | | | 416 | |
| 370 | *Brassica Rapa* (White Stone Turnip)<br>From England | — | *Stellaria media* (Chickweed).. | 291 | 4.656 | 6½ |
| | | | *Chenopodium album* ......... | 2 | 32 | — |
| | | | | | 4,688 | |
| 434A | *Linum usitatissimum* (Linseed)<br>From Argentine | 13 bags | *Silene gallica* (French Catchfly) | 200 | 3,200 | 325 |
| | | | *Lolium temulentum* ......... | 10 | 160 | — |
| | | | *Agrostemma Githago* ........ | 4 | 64 | — |
| | | | *Rumex* sp. (Dock) .......... | 6 | 96 | — |
| | | | *Lolium* sp. ................ | 400 | 6,400 | — |
| | | | | | 9,920 | |
| 441 | *Phalaris canariensis* (Canary Grass)<br>From Morocco | 58 bags | *Lolium temulentum* ......... | 112 | 1,792 | 1,195 |
| | | | *L. rigidum* (?) ............. | 50 | 800 | — |
| | | | *Rumex* sp. ................. | 4 | 64 | — |
| | | | *Brassica Sinapistrum* ........ | 5 | 80 | — |
| | | | *Silene* sp. ................. | 2 | 32 | — |
| | | | *Triticum sativum* .......... | 48 | 768 | — |
| | | | Others .................... | 15 | 240 | — |
| | | | | | 3,776 | |
| 484 | *Lepidium sativum, L.* (Curled Cress)<br>From England | 224lbs. | *Stellaria media* ............ | 78 | 1,248 | 8½ |
| | | | *Chenopodium album* ......... | 23 | 368 | — |
| | | | *Polygonum Persicaria* ....... | 4 | 64 | — |
| | | | *Silene* sp. ................. | 3 | 48 | — |
| | | | | | 1,728 | |

*Consignments destroyed on account of the large number of foreign seeds contained, including two species of *Ambrosia*, which hitherto, apparently, have not established themselves in South Australia.

**Table III.**—*Table Showing the Frequency of Occurrence of Noxious and Other Weed Seeds in Consignments of Seed Examined under the Federal Quarantine and Commerce Acts (Year ended June 30th, 1916).*

| Noxious and Other Weed Seeds Found in Three or More Samples. | No. of Samples. |
|---|---|
| Black Bindweed ........................................ | 31 |
| Catchfly ........................................ | 12 |
| Charlock ........................................ | 20 |
| Chickweed ........................................ | 9 |
| Chicory ........................................ | 4 |

Table III.—*Table Showing the Frequency of Occurrence of Noxious and Other Weed Seeds in Consignments of Seed Examined under the Federal Quarantine and Commerce Acts (Year ended June 30th,* 1916)—continued.

| Noxious and Other Weed Seeds Found in Three or More Samples. | No. of Samples. |
|---|---|
| Cockspur and Thistle sp. | 14 |
| Corn Spurry | 4 |
| Darnel or Drake | 17 |
| Goosefoot, Fat Hen | 16 |
| •Hawkweed | 3 |
| Knotweed, Hogweed, or Wireweed | 8 |
| Lesser Bindweed | 8 |
| *Polygonum* sp. | 13 |
| Rib Grass | 8 |
| Rooted Cat's Ear | 4 |
| Sheep Sorrel | 6 |
| Turnip-weed | 12 |
| White Cockle | 3 |
| Yellow Foxtail | 4 |

## GRAFTING WAX.

Replying to a correspondent, who sought information relating to the manufacture of grafting wax, Mr. Quinn gave the formula he always used, as follows:—Four parts by weight resin (powdered), 1½ parts by weight beef or mutton tallow (not salted), 2 parts by weight beeswax. The tallow and beeswax should be placed in a vessel and dissolved over a fire, and the powdered resin then slowly stirred in. This should be boiled for about 20 minutes, until all is dissolved. Then pour the molten wax into a bucket of clean water, and after greasing the hands well, lift it out and knead it down to a fine even grain. If wrapped in damp-proof paper it will keep for years. This wax will become plastic by placing it by the fire for a few minutes or in the sun for an hour or two. It will work then with the warmth from the hands. To remove it from the hands use oil or grease before soap and water, as nothing else will shift it. If waxed cloth is needed for small stocks, roll strips of cheap calico torn to a couple of inches in width around the end of a stick—perforated bamboo for preference—and hold it for five minutes in the boiling wax to become impregnated through, taking care not to rest it on the bottom or sides of the pot, or the cloth will char. This can be torn into bands and used as required, but the calico rots in about a year.

# REGISTRATION OF SHOEING SMITHS.

A scheme that will commend itself to horseowners generally, is the suggested provision for the registration of shoeing smiths. Much cruelty and economic loss is attributable to insufficient training of shoeing smiths, and with the idea of obviating this, the Government Veterinary Lecturer (Mr. F. E. Place, B.V.Sc., M.R.C.V.S.) has suggested the inauguration of a private scheme under the control of the Master Farriers' Association and a public educational body, such as the School of Mines. The essentials of such a scheme would be instruction, both practical and theoretical, and bodies like the Society for the Prevention of Cruelty to Animals and the Agricultural Society would be able to lend a great help by encouraging competitions at shows, etc. The registration diploma to be issued should state definitely that the bearer had been well instructed and passed an examination, and should offer a short title such as R.S.S., *i.e.*, Registered Shoeing Smith. Existing smiths might be admitted to the register either by examination or payment of a fee or recommendation of the Master Farriers' Association, but it is essential that their register should be separate from that of examinee, and naturally by lapse of time it would become void. If the funds of the examining body permit, instruction should be given also at country centres, and probably the Advisory Board of Agriculture would assist it through the Branches of the Agricultural Bureau.

A similar scheme exists in England, in the initiation of which Mr. Place took an active part, both as instructor and examiner. Although originally inaugurated as a private scheme by the Worshipful Company of Farriers, it is now subsidised to some extent by Government and in addition to the company, the following bodies assist in its being carried out:—The Royal Agricultural Society, the Royal College of Veterinary Surgeons, and the Royal Society for the Prevention of Cruelty to Animals.

The elaboration of a scheme to meet the local conditions is now receiving consideration, the Master Farriers' Association having taken steps to bring about a conference of representatives of interested bodies.

It is to be hoped that the result will be, not only an improvement in the status of farriers, but also the elimination of a good deal of unnecessary suffering on the part of horses.

# ADVISORY BOARD OF AGRICULTURE.

The monthly meeting of the Advisory Board was held on Wednesday, August 9th, there being present Messrs. Coleman (chair), Colebatch, Jeffrey, Dawkins, Miller, Tuckwell, Williams, and Finnis (Acting Secretary). Apologies were received from Messrs. Laffer and Birks.

## Pea Harvester.

The Mount Barker Branch of the Agricultural Bureau suggested that the Board should use its influence to get the Government to offer a bonus for a machine that would cut and thresh a crop of peas in one operation. The Board was not disposed to take any action in the matter.

## Fares for Congress Delegates.

Consideration was given to the question of providing fares for two delegates to Congress from each Branch, whether in rail, road, or sea communication with the city. It was decided to request the Hon. Minister of Agriculture to approve of this provision.

## Registered Shoeing Smiths.

The Master Farriers Association requested the Board to appoint a representative to confer with delegates from other interested bodies to consider the question of inaugurating a scheme for the registration of shoeing smiths. Mr. W. J. Colebatch was selected as the Board's representative.

## Lower Northern Branches Conference.

After due consideration it was decided that the 1917 Conference of Branches situated in the Lower Northern District should be held at Lyndoch.

## Blood and Bone Manure.

At the instance of Mr. Williams it was decided to direct the attention of the Minister to the fact that notwithstanding the heavy local demand for blood and bone manure, supplies manufactured in this State were being disposed of in New South Wales.

## Preservation of Roads.

Mr. Dawkins raised the question of the wisdom of limiting the weight of loads to be carried over roads during certain months of the year. He undertook to bring forward suggestions to meet the case, the matter to be dealt with at the next meeting.

## Olive Oil.

The Principal of the College (Mr. Colebatch) tabled a sample of oil manufactured at the College at Roseworthy, and members expressed their appreciation of the quality of the product.

### LIFE MEMBERS.

The following names were added to the list of life members of the Agricultural Bureau: Messrs. E. Copley (Orroroo), T. Collett (Strathalbyn), R. Player (Angaston), W. Sibley (Angaston), A. Johnstone (Naracoorte).

Two new Branches were approved. One hundred and forty-six names were added to the rolls of existing Branches.

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# ARTIFICIAL MANURES.

Figures given below, and compiled by the Government Statist (Mr. W. L. Johnston), show that the quantity of artificial manure used in this State during 1915-16 was 98,258 tons on 3,040,273 acres, which means an average dressing of 72·4lbs. per acre. Of the area cropped throughout the State, 80·78 per cent. received application of artificial manure. In addition, 88,664 loads of stable manure were applied to 15,678 acres.

The figures are tabulated as follows :—

*Artificial Manures used in Farming.*

(Compiled from Farmers' Returns.)

| Division. | Area Cropped. | | | Manure Used. | |
|---|---|---|---|---|---|
| | Total. | Manured. | Percentage Manured to Total. | Total. | Average per Acre. |
| | Acres. | Acres. | % | Tons. | lbs |
| Central | 1,273,889 | 1,024,179 | 80·40 | 39,601 | 86·6 |
| Lower North | 1,048,450 | 957,050 | 91·28 | 29,589 | 69·3 |
| Upper North | 348,523 | 185,655 | 53·27 | 5,069 | 61·2 |
| South-Eastern | 502,489 | 444,731 | 88·51 | 12,566 | 63·3 |
| Western | 589,792 | 428,458 | 72·65 | 11,428 | 59·8 |
| Outside Counties | 427 | 200 | 46·84 | 5 | 56·0 |
| Total—1915-16 | 3,763,570 | 3,040,273 | 80·78 | 98,258 | 72·4 |
| 1914-15 | 3,282,364 | 2,789,479 | 84·98 | 97,421 | 78·2 |
| 1913-14 | 3,169,559 | 2,659,608 | 83·91 | 97,023 | 81·7 |
| 1912-13 | 3,062,998 | 2,588,133 | 84·50 | 91,607 | 79·3 |
| 1911-12 | 2,965,338 | 2,494,773 | 84·13 | 87,475 | 78·5 |

In addition, stable manure was used as follows :—

| | 1911-12. | 1912-13. | 1913-14. | 1914-15. | 1915-16. |
|---|---|---|---|---|---|
| Loads of stable manure used | 134,503 | 111,434 | 100,435 | 103,149 | 88,664 |
| Acres manured | 16,357 | 15,003 | 15,206 | 16,455 | 15,678 |

## DAIRY AND FARM PRODUCE MARKETS.

A. W. Sandford & Co., Limited, report on September 1st:—

BUTTER.—Soaking rains were recorded throughout the agricultural areas during August, and the quantities of dairy produce coming forward show a further heavy increase on the month previous. There is now a surplus of butter in this State, and this is finding an outlet in other markets. Values have, in consequence, steadily eased, and "Alfa" is now quoted at 1s. 4d.; "Primus," 1s. 3½d.; third-grade creamery, 1s. to 1s. 1d.; choice separators and dairies, 1s. 1d. to 1s. 2d.; store and collectors', 10d. to 11d. per lb.

EGGS.—A seasonable reduction in price is to be reported in this line, quantities being marketed continuing to increase week by week, and the production showing a very substantial improvement over the corresponding period of a year ago. Fair interstate trade is being done, and local picklers have also started operations for the season. The rooms, therefore, have been kept nicely cleared, closing quotations, for loose at mart, being:—Hen, 9½d.; duck, 10½d. per dozen.

CHEESE.—In sympathy with the lowering in butters, cheese values have further receded, though fair business has been recorded both local and export. Prices now are 7¼d. to 8d. per lb. for large to loaf.

HONEY.—Another quiet month has been experienced in this line, prices having declined, present rate being 4½d. per lb. for prime clear extracted, while second grades are neglected. Beeswax is being inquired for at about 1s. 5½d. per lb.

ALMONDS.—There is no alteration under this heading. Stocks are exhausted, and buyers are already looking forward to the new season's crop. Market is therefore nominally—Brandis, 9½d.; mixed softshells, 8½d.; hardshells, 4d.; kernels, 1s. 5d. per lb.

BACON has experienced considerable inquiry, local cured being very short, and importations are coming along to make good the deficiency. Best factory-cured sides are now selling at 11½d. to 1s. ½d. per lb.; hams, 1s. to 1s. 1d. per lb.

LIVE POULTRY.—Heavy pennings have been experienced throughout the month, each of our three sales a week being well supplied; but the active competition has readily cleared all offering, with values well maintaining the closing prices of last month. Good table roosters, 3s. 3d. to 3s. 10d. each; nice-conditioned cockerels, 2s. 9d. to 3s. 6d.; plump hens, 2s. 6d. to 3s. 6d.; ducks, 3s. 9d. to 4s. 8d.; geese, 5s. 6d. to 6s. 6d.; pigeons, 10d.; turkeys from 6¾d. to 10d. per lb. live weight for fattening sorts to good table birds.

POTATOES AND ONIONS.—The Adelaide market has fluctuated in sympathy with Victoria, whence practically the whole of the supplies have been drawn. ONIONS.—Quantities in the South-East are about finished, the Adelaide market now drawing from the surrounding Hills and the Colac district of Victoria. Prices are somewhat below the level of our previous report. Quotations:—Potatoes, £7 10s. to £8 10s. per ton on rails, Mile End or Port Adelaide; onions, £5 per ton on rails, Mile End or Port Adelaide.

# THE AGRICULTURAL OUTLOOK.

## REPORT FOR MONTH OF AUGUST.

The following reports on the general agricultural condition and outlook of the areas represented by the Government Experimental Farms mentioned below have been prepared by the respective managers:—

*Eyre's Peninsula.*—Weather has been changeable. Good rains have been recorded, 2¼in. up to date (25th). This is an inch less than was registered during August, 1915, but the total fall for the year to date is ½in. better than that for the corresponding period of last year. Temperatures have risen considerably during latter end of month. Some heavy north and north-west winds prevailed at times. Three frosts and one fog were recorded, and somewhat unusual thundery weather occurred on August 13th and 14th. Crops growing on fallow and land cleared last season are making very good headway; many patches are showing rather rank, but otherwise are very healthy. Wheat sown on last year's stubbles is backward. Natural feed has made good growth during the month on the open bush country. Miscellaneous—Quite a comparatively large number of fruit trees, olive truncheons, and garden plants have been planted in the district.

*Booborowie.*—Weather—The first three weeks of the month were very wet; rain fell on nearly every day. This was followed by three bright days. Crops are very backward; the excessive wetness of the ground is causing many to lose their bright color and become yellow in patches. Natural feed is at a standstill, warmer weather being required to make it grow. Stock is in fair condition, but are needing some spring weather to make them improve. Pests—Rabbits are numerous, and trapping is being carried on by the farmers. Miscellaneous—Those farmers on the flat who have made drains are finding the benefit of them this year.

*Kybybolite.*—Weather—The rainfall for this month was a little greater than the average, but the individual falls were light. Shower conditions have been general, with the weather setting in warm at the end of the month. Crop prospects are satisfactory, and although the oat areas have become somewhat discolored, good spring conditions should produce a good recovery. The fodder plant kale is doing wonderfully well in this immediate locality; its value has been definitely demonstrated, and a rapid extension of the area sown is predicted. Natural feed, like the crops, has received a great impetus from the warmer weather now experienced, and is therefore plentiful. Stock—Horses are showing improved condition, cattle are very good, and sheep fair to good. The spring lambing is progressing favorably. Pests—Foxes have caused the loss of a few young lambs. Miscellaneous—Fallowing operations are now becoming general.

*Turretfield.*—Weather—August was a wet month, with only a few fine days occurring at intervals. The rainfall for the month totalled 3.43in. Temperatures were mild, and no frosts of any note were experienced. The 26th proved a sultry day, ending with a thunderstorm during the night, and accompanied by a strong wind. Crops of all description are making good headway. The early-sown crops are getting the better of the weeds, and there are few weeds in the later-sown fields. Natural feed is abundant. Stock are doing well, and though the horses are looking rough owing to change of coats, they are all healthy, and no outbreak of disease has occurred in the district. Sheep and lambs are also looking well. Pests—Caterpillars are noticeable in large numbers, but so far as can be ascertained are doing no material damage. Miscellaneous—Floods have again taken a goodly number of trees along the banks of the North Para. Owing to the continued wet weather fallowing operations have been somewhat hampered, but farmers are losing no opportunity of working their teams whenever the condition of the soil permits.

*Veitch.*—Weather conditions for the month have proved excellent for the land under crop. The Veitch rain gauge registered 401 points; average for the month, 101 points. Crops are all making good growth, the sand ridges do not look as healthy as the flats. Natural Feed—Good. Stock—All in good healthy condition. Miscellaneous—Fresh areas are being rolled in the district, and old land is being fallowed.

## RAINFALL TABLE.

The following figures, from data supplied by the Commonwealth Meteorological Department, show the rainfall for the month of and to the end of August, 1916, also the average precipitation to the end of August, and the average annual rainfall.

| Station. | For Aug., 1916. | To end Aug., 1916. | Av'ge. to end Aug | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| **Far North and Upper North.** | | | | |
| Oodnadatta | — | 5·75 | 3·33 | 4·76 |
| Tarcoola | 0·31 | 3·25 | 5·17 | 7·58 |
| Hergott | — | 2·42 | 4·16 | 6·04 |
| Farina | 0·13 | 3·84 | 4·68 | 6·70 |
| Leigh's Creek | 0·32 | 3·71 | 6·14 | 8·66 |
| Beltana | 0·61 | 4·86 | 6·37 | 9·22 |
| Blinman | 1·16 | 8·23 | 9·20 | 12·83 |
| Hookina | 2·28 | 11·96 | — | — |
| Hawker | 2·43 | 12·66 | 8·58 | 12·22 |
| Wilson | 1·95 | 12·19 | 8 31 | 11·78 |
| Gordon | 1 36 | 8·95 | 7·06 | 10·26 |
| Quorn | 2·48 | 13·09 | 9·79 | 13·78 |
| Port Augusta | 1·12 | 6·54 | 6·45 | 9·46 |
| Port Augusta W. | 1·23 | 6·56 | 6·35 | 9·36 |
| Bruce | 1·29 | 7·78 | 5·74 | 10·01 |
| Hammond | 1·35 | 8·02 | 5·72 | 11·46 |
| Wilmington | 2·34 | 14·58 | 13·12 | 18·26 |
| Willowie | 2·11 | 9·68 | 7·38 | 11·90 |
| Melrose | 4·13 | 21·48 | 15·75 | 23·04 |
| Booleroo Centre | 2·43 | 12·21 | 8·05 | 15·83 |
| Port Germein | 1·91 | 8·23 | 9·48 | 12·84 |
| Wirrabara | 4·63 | 19·57 | 15·70 | 18·91 |
| Appila | 2·56 | 11·11 | 8·14 | 15·08 |
| Cradock | 1·68 | 8·24 | 6·01 | 10·86 |
| Carrieton | 1·81 | 10·66 | 7·97 | 12·22 |
| Johnburg | 1·44 | 7·59 | 5·15 | 10·21 |
| Eurelia | 2·05 | 10·54 | 8·46 | 13·24 |
| Orroroo | 1·76 | 10·96 | 7·31 | 13·42 |
| Black Rock | 1·72 | 9·97 | 6·72 | 12·25 |
| Petersburg | 1·89 | 10·10 | 7·72 | 13·07 |
| Yongala | 2·59 | 12·11 | 9·50 | 13·94 |
| **North-East.** | | | | |
| Ucolta | 1·48 | 8·37 | — | — |
| Nackara | 1·29 | 7·40 | — | — |
| Yunta | 1·60 | 5·73 | 5·49 | 8·22 |
| Waukaringa | 1·21 | 6·03 | 5·46 | 7·94 |
| Mannahill | 0·60 | 5·56 | 5·71 | 8·46 |
| Cockburn | 0·54 | 6·06 | 5·57 | 7·97 |
| Broken Hill, NSW | 0·70 | 5·39 | 6·71 | 9·63 |
| **Lower North.** | | | | |
| Port Pirie | 2·68 | 10·91 | 10·27 | 13·21 |
| Port Broughton | 2·97 | 14·22 | 10·20 | 14·33 |
| Bute | 4·30 | 15·71 | 11·24 | 15·42 |
| Laura | 3·44 | 15 28 | 12 48 | 18·22 |
| Caltowie | 3·30 | 13·12 | 11·57 | 17·27 |
| Jamestown | 3·61 | 14·71 | 11·71 | 17·46 |
| Gladstone | 2·99 | 12·20 | 10·81 | 16·00 |
| Crystal Brook | 2·75 | 13·18 | 10·88 | 15·62 |
| Georgetown | 3·44 | 15·29 | 12·68 | 18·32 |
| Narridy | 3·27 | 12·22 | 10·69 | 16·79 |
| Redhill | 4·53 | 15·95 | 12·98 | 16·79 |
| **Lower North—*continued.*** | | | | |
| Spalding | 4·78 | 17·95 | 13·44 | 20·25 |
| Gulnare | 3·99 | 16·30 | 13·34 | 19·74 |
| BundaleerW.Wks. | 4·08 | 16·49 | 11·36 | 17·29 |
| Yacka | 4·20 | 14·07 | 10·72 | 15·27 |
| Koolunga | 4·11 | 14·25 | 11·31 | 15·94 |
| Snowtown | 4·90 | 16·83 | 11·30 | 15·70 |
| Brinkworth | 5·30 | 16·32 | 10·76 | 15·48 |
| Blyth | 4·04 | 15·05 | 11·53 | 16·34 |
| Clare | 6·45 | 23·71 | 17·17 | 24·30 |
| Mintaro Central | 7·63 | 24·39 | 15·25 | 21·99 |
| Watervale | 8·15 | 25·76 | 19·25 | 27·17 |
| Auburn | 5·12 | 18·45 | 17·08 | 24·25 |
| Hoyleton | 4·03 | 13·03 | 13·67 | 17·96 |
| Balaklava | 3·43 | 11·47 | 11·21 | 16·03 |
| Port Wakefield | 2·49 | 11·68 | 9·61 | 13·13 |
| Terowie | 2·60 | 9·57 | 10·12 | 13·71 |
| Yarcowie | 2·66 | 10·94 | 9·42 | 13·91 |
| Hallett | 3·67 | 12·19 | 11·04 | 16·40 |
| Mount Bryan | 5·52 | 18·04 | 10·75 | 15·73 |
| Burra | 4·64 | 18·37 | 13·33 | 17·82 |
| Farrell's Flat | 5·44 | — | 13·32 | 18·87 |
| **West of Murray Range.** | | | | |
| Manoora | 5·00 | 16·40 | 12·45 | 18·09 |
| Saddleworth | 3·94 | 14·18 | 13·86 | 19·69 |
| Marrabel | 6·48 | 20·85 | 13·23 | 18·94 |
| Riverton | 4·54 | 19·18 | 14·36 | 20·48 |
| Tarlee | 3·30 | 14·76 | 12·07 | 17·48 |
| Stockport | 3·32 | 15·53 | 10·91 | 15·89 |
| Hamley Bridge | 2·77 | 14·20 | 11·49 | 16·45 |
| Kapunda | 3·86 | 18·04 | 13·75 | 19·67 |
| Freeling | 3·20 | 16·56 | 12·42 | 17·85 |
| Greenock | 5·19 | 22·91 | 14·77 | 21·46 |
| Truro | 5·02 | 19·54 | 13·78 | 19·74 |
| Stockwell | 4·26 | 18·86 | 14·01 | 20·30 |
| Nuriootpa | 4·56 | 20·34 | 14·81 | 21·25 |
| Angaston | 5·53 | 22·56 | 15·45 | 22·25 |
| Tanunda | 4·44 | 20·52 | 15·65 | 22·28 |
| Lyndoch | 4·50 | 18·47 | 16·40 | 23·01 |
| **Adelaide Plains.** | | | | |
| Mallala | 2·32 | 12·06 | 11·90 | 16·88 |
| Roseworthy | 3·20 | 14·28 | 12·13 | 17·31 |
| Gawler | 3·53 | 17·71 | 13·63 | 19·21 |
| Two Wells | 2·25 | 13·13 | 11·89 | 16·36 |
| Virginia | 3·15 | 14·88 | 12·64 | 17 58 |
| Smithfield | 3·14 | 15·31 | 12·19 | 17·30 |
| Salisbury | 3·81 | 10·45 | 13 44 | 18·57 |
| North Adelaide | 4·65 | 23 06 | 15 55 | 21·49 |
| Adelaide | 3·99 | 20·04 | 15·37 | 21·04 |
| Brighton | 4·42 | 19·92 | 14·33 | 19·93 |
| Glenelg | 3·97 | 17·81 | 13·38 | 18·35 |

## RAINFALL—*continued.*

| Station. | For Aug., 1916. | To end Aug., 1916 | Av'ge. to end Aug. | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| **ADELAIDE PLAINS—*continued.*** | | | | |
| Magill | 4·42 | 19·25 | 19·79 | 25·69 |
| Glen Osmond | 4·92 | 24·88 | 18·41 | 25·26 |
| Mitcham | 4·83 | 22·28 | 17·19 | 23·47 |
| Belair | 5·69 | 13·79 | 21·14 | 28·64 |
| **MOUNT LOFTY RANGES.** | | | | |
| Teatree Gully | 5·21 | 23·40 | 20·38 | 28·19 |
| Stirling West | 9·23 | 41·08 | 34·34 | 46·70 |
| Uraidla | 9·85 | 41·30 | 32·75 | 44·35 |
| Clarendon | 5·53 | 28·33 | 24·65 | 33·67 |
| Morphett Vale | 3·85 | 19·66 | 16·82 | 23·32 |
| Noarlunga | 3·63 | 17·39 | 14·91 | 20·28 |
| Willunga | 3·87 | 21·75 | 19·05 | 25·98 |
| Aldinga | 3·57 | 17·43 | 14·91 | 20·34 |
| Normanville | 3·36 | 19·89 | 15·27 | 20·65 |
| Yankalilla | 4·54 | 33·44 | 16·99 | 22·78 |
| Cape Jervis | 1·91 | 12·64 | 12·39 | 16·34 |
| Mount Pleasant | 5·19 | 24·23 | 19·28 | 26·87 |
| Blumberg | 5·99 | 26·03 | 21·37 | 29·38 |
| Gumeracha | 6·68 | 28·38 | 23·94 | 33·30 |
| Lobethal | 7·55 | 32·96 | 25·79 | 35·38 |
| Woodside | 6·04 | 25·59 | 22·85 | 31·87 |
| Hahndorf | 6·46 | 26·11 | 25·45 | 35·45 |
| Nairne | 4·61 | 20·14 | 20·58 | 28·83 |
| Mount Barker | 6·23 | 26·08 | 22·17 | 30·93 |
| Echunga | 5·90 | 26·03 | 23·73 | 32·83 |
| Macclesfield | 4·72 | 23·81 | 21·76 | 30·72 |
| Meadows | 7·12 | 31·70 | 25·43 | 35·52 |
| Strathalbyn | 2·18 | 14·28 | 13·74 | 19·28 |
| **MURRAY FLATS AND VALLEY.** | | | | |
| Wellington | 2·61 | 10·62 | 10·31 | 15·01 |
| Milang | 1·52 | 9·04 | 11·62 | 16·08 |
| Langhorne's Brdg | 1·90 | 9·13 | 10·60 | 15·27 |
| Tailem Bend | 1·90 | 10·00 | — | — |
| Murray Bridge | 1·51 | 8·25 | 9·90 | 14·32 |
| Callington | 1·97 | 10·21 | 11·04 | 15·65 |
| Mannum | 1·41 | 7·16 | 8·23 | 11·67 |
| Palmer | 2·23 | 10·87 | 10·58 | 15·60 |
| Sedan | 2·81 | 10·78 | 8·48 | 11·92 |
| Blanchetown | 1·89 | 5·23 | 7·25 | 10·71 |
| Eudunda | 3·94 | 15·50 | 12·09 | 17·33 |
| Sutherlands | 2·74 | 9·83 | 7·19 | 10·60 |
| Morgan | 2·66 | 6·76 | 6·01 | 9·29 |
| Overland Corner | 2·47 | 5·94 | 7·37 | 11·42 |
| Renmark | 2·46 | 6·85 | 7·81 | 10·93 |
| Loxton | 3·07 | 9·34 | — | — |
| **WEST OF SPENCER'S GULF.** | | | | |
| Eucla | 1·56 | 7·45 | 7·60 | 10·13 |
| White Well | 0·90 | 9·27 | 6·86 | 9·67 |
| Fowler's Bay | 1·75 | 11·48 | 9·54 | 12·11 |
| Penong | 1·86 | 14·70 | 9·11 | 11·93 |
| Murat Bay | 1·75 | 10·11 | — | — |
| Smoky Bay | 1·56 | 10·43 | — | — |

| Station. | For Aug., 1916. | To end Aug., 1916. | Av'ge. to end Aug. | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| **WEST OF SPENCER'S GULF—*continued.*** | | | | |
| Streaky Bay | 1·75 | 12·35 | 11·91 | 15·31 |
| Port Elliston | 2·89 | 15·66 | 12·80 | 16·49 |
| Port Lincoln | 3·28 | 19·23 | 15·07 | 19·88 |
| Tumby | 1·65 | 12·08 | 11·06 | 15·00 |
| Carrow | 2·62 | 13·09 | — | — |
| Cowell | 0·83 | 6·59 | 8·33 | 11 76 |
| Point Lowly | 1·67 | 8·21 | 8·14 | 12·21 |
| **YORKE'S PENINSULA.** | | | | |
| Wallaroo | 2·58 | 13·38 | 10·34 | 14·05 |
| Kadina | 3·81 | 15·89 | 11·73 | 15·88 |
| Moonta | 3·64 | 16·04 | 11·27 | 15·22 |
| Green's Plains | 4·50 | 15·15 | 11·65 | 15·73 |
| Maitland | 5·18 | 22·70 | 14·77 | 20·08 |
| Ardrossan | 2·82 | 13·69 | 10·10 | 13·89 |
| Port Victoria | 4·04 | 16·95 | 11·23 | 15·20 |
| Curramulka | 3·25 | 16·49 | 13·55 | 18·51 |
| Minlaton | 3·59 | 18·55 | 12·95 | 17·41 |
| Stansbury | 2·90 | 14·20 | 12·47 | 17·06 |
| Warooka | 3·23 | 16·29 | 13·33 | 17·71 |
| Yorketown | 3·25 | 16·04 | 12·80 | 17·47 |
| Edithburgh | 3·35 | 16·54 | 12·11 | 16·48 |
| **SOUTH AND SOUTH-EAST.** | | | | |
| Cape Borda | 3·46 | 20·44 | 19·81 | 25·09 |
| Kingscote | 2·99 | 17·71 | 14·35 | 18·95 |
| Penneshaw | 2·90 | 16·96 | 15·97 | 21·34 |
| Cape Willoughby | 3·56 | 20·66 | 14·40 | 19·69 |
| Victor Harbor | 2·36 | 13·94 | 16·08 | 22·18 |
| Port Elliot | 2·23 | 12·82 | 14·63 | 20·33 |
| Goolwa | 2·09 | 14·01 | 12·88 | 17·93 |
| Pinnaroo | 3·51 | 11·48 | 11·33 | 16·74 |
| Parilla | 2·94 | 12·90 | — | — |
| Lameroo | 3·43 | 13·31 | 10·88 | 16·55 |
| Parrakie | 3·17 | 10·99 | — | — |
| Geranium | 3·43 | 13·14 | — | — |
| Peake | 2·87 | 12·50 | — | — |
| Cooke's Plains | 3·28 | 13·34 | 10·18 | 14·74 |
| Meningie | 3·77 | 17·22 | 13·53 | 18·87 |
| Coomandook | 4·04 | 15·44 | — | 17·49 |
| Coonalpyn | 3·68 | 14·93 | 12·21 | 16·80 |
| Tintinarra | 4·06 | 15·37 | 13·09 | 18·78 |
| Keith | 3·63 | 14·09 | — | — |
| Bordertown | 3·26 | 13·52 | 13·30 | 19·76 |
| Wolseley | 3·39 | 13·49 | 11·97 | 17·72 |
| Frances | 2·87 | 12·45 | 13·76 | 20·74 |
| Naracoorte | 3·50 | 15·35 | 15·55 | 22·60 |
| Penola | 4·08 | 17·77 | 18·71 | 26·78 |
| Lucindale | 3·36 | 16·30 | 16·66 | 23·32 |
| Kingston | 3·64 | 18·20 | 18·34 | 24·73 |
| Robe | 3·02 | 23·10 | 18·76 | 24·69 |
| Beachport | 3·44 | 24·59 | 21·24 | 27·51 |
| Millicent | 5·49 | 26·18 | 21·73 | 29·25 |
| Mount Gambier | 4·89 | 22·06 | 22·58 | 32·00 |
| C. Nrthumberland | 4·98 | 20·73 | 19·58 | 26·63 |

# THE AGRICULTURAL BUREAU.

## CONFERENCE AT TAILEM BEND.

A Conference of delegates from the Branches of the Agricultural Bureau served by the Pinnaroo, Brown's Well, and Waikerie railway lines was held in the institute, at Tailem Bend, on Thursday, August 31st. Mr. R. Upton, Chairman of the Coomandook Branch, presided, and there were also present the Minister of Agriculture (Hon. C. Goode, M.P.), Mr. W. J. Spafford (Superintendent of Experimental Work), Mr. Henshaw Jackson (Wool Instructor to the School of Mines), and Mr. F. Coleman (Chairman), Mr. G. Jeffrey, and Mr. H. J. Finnis (Acting Secretary of the Advisory Board of Agriculture). There was a large and representative gathering of delegates.

The Chairman welcomed the Minister of Agriculture, the departmental experts, and the members and officers of the Advisory Board, and said that he was pleased to see such a representative gathering of farmers, especially as the Bureau was almost their only source of agricultural education. Unfortunately agriculture was not taught in their schools. Most of the country schools were in charge of young women from the city and suburbs, who were not tutored in agriculture, and it was utterly impossible for them to impart the principles and instil a love of the subject into the children. They were indebted very largely for the progress which had been made, to the departmental experts.

### OPENING ADDRESS.

The Minister of Agriculture, in acceding to the Chairman's request to open the Conference, said the Government realised the burden of the war, and it was necessary to wring from the soil the utmost in wealth and produce. Their hope for the future was to settle the lands more closely than at present, and closer settlement must be pushed on with the utmost rapidity at their command, not only in the direction of settling men on the soil, but of getting more from the land under cultivation than they did at present. They had large problems to face in regard to the occupation of land, especially in the mallee country, and the Agricultural Department would make every effort to cope with them, and would carry out to the utmost experimental work to enable the farmers to do the most with the land they had in occupation. The Government realised that for many years wheat-growing would be their staple product so far as the mallee country was concerned, but they had to look in other directions and not depend on wheat alone. Some of the settlers along the line had been doing valuable experimental work, and he hoped that it would give financial gain to themselves and that they would impart their experience to their neighbors.

### Conservation of Fodder.

The high price of stock forced their attention in the direction of carrying more stock and replenishing the depletion caused by the drought so that they might be prepared for the next drought when it came along. That could be done by conserving fodder. The cocky chaff which they despised should be saved for the time of drought, for, just as surely as the sun would rise on the morrow, the drought would come again, and they should be in a position to meet it by having stored the fodder which was going to waste. They could then face the position with safety instead of living from hand to mouth as they did at present, with nothing to fall back upon.

### Irrigation.

He hoped that they would be able to do something in the Pinnarroo area to conserve water suitable for irrigating those lands. If bores were carried to a greater depth he thought it would be proved that they had artesian or sub-artesian supplies in the Pinnaroo district. None of the bores in the areas suitable for irrigation had been carried to a depth which would test the possibility of raising it to the surface, for it was doubtful whether water could be raised 200ft. or 300ft. by any known appliance in the way of pumping at a sufficiently low cost to make irrigation a profitable proposition. One of the leading manufacturers in Adelaide had told him last week that he was expecting a new engine to come to hand shortly which he anticipated would very largely reduce the cost of pumping, and he would then submit a price for raising water from 200ft. for irrigation purposes. There was an overflow of water in the mallee east of Pinnaroo, at Alexandra, and at Tintinara, so it seemed possible, as they had three points of a triangle at which a water supply could be obtained, they might find it between those points. If so, the future of that country, where the water was suitable for irrigation, gave great promise. If they could not get an artesian or a sub-artesian supply, they might get the present supply by some mechanical means at a low cost, which would enable each farmer to have five or six acres under lucerne, which would give him feed during summer, and enable him to increase the output of his farm, and add to the wealth of the State. By such means sheep could be kept more profitably, and from a dairying point of view, if each settler had half a dozen cows in full milk they could understand what an increase it would mean to the dairying industry. He was going to have a fresh investigation made by the Government Geologist, and though they reported against artesian water in that area—they admitted that they could not always tell from surface indications what was lying below—it was worth while putting down a bore to a depth to test the country from a water supply point of view. If anything were possible along that line they would seek to discover it, and he trusted that, whether his surmise in that direction proved correct or not, they would be able to do something with smaller bores which would give them an indication of what could be done. He had also in his mind that the Government should be prepared to finance irrigation plants on easy terms, so that settlers might take advantage of it where the departmental officers recommended that it was practicable. He fully appreciated the difficulties which the farmers in that district had to contend with, and he admired the spirit with which they had gone into the mallee and battled against adverse conditions and came up smiling time after time. That there were so many producers there who took an interest in the Bureau was an indication of their spirit, and he was glad to see so many throughout that area who were taking sufficient interest in the work of the Bureau to attend the Conference. He hoped that the discussion which would take place on the papers would bring about improved methods which would enable them to face the future with greater confidence. He had very much pleasure in declaring the Conference open.

### SUBSIDIES FOR SILOS.

Mr. F. Norton (Geranium) proposed a vote of thanks to the Minister of Agriculture for his sympathetic and able address. He referred to the necessity for mixed farming, and approved heartily of the suggested assistance from the Government to enable farmers to secure irrigation plants. In Victoria the Government gave subsidies in connection with the establishment of silos. He did not know anything more useful where mixed farming was practised than a good silo. If the Government would consider a scheme to finance farmers in erecting silos it would be a good thing. They should not be dependent on the vagaries of the seasons, otherwise they would always be buying when everyone else was buying, and selling when everyone else was selling, and they must avoid that.

Mr. A. J. A. Koch (Lameroo) seconded the motion, which was carried with acclamation.

The Minister of Agriculture, in reply, said that he had attempted to do a little in experiments himself, but his many ministerial duties prevented him giving personal attention to his farming. He had obtained from Western Australia a special seed oat, and the Sunrise oat from New South Wales. He would test the seed, and if he obtained good results he would see that it was distributed among the farmers of that district. He had secured from New South Wales a wheat called Sunset, which matured two weeks earlier than Bunyip, which they knew grew early. In that district, if they could get an early maturing wheat it would be very beneficial. They could rely upon sympathetic administration in regard to experimental research work on behalf of the producers of South Australia. Mr. Norton's suggestion in regard to subsidising silos was one he would bring before his colleagues, and he hoped to announce, at the coming Congress, that something along those lines might be done. (Applause.)

## CEREAL GROWING AND STOCK RAISING.

Mr. H. Ledger (Pinnaroo) read a paper on cereal growing and stock raising. "In treating this subject," he said, "it is right to place wheat growing first. Of course we as farmers are taking the subjects in combination, cereal growing and stock raising. Wheat has played such an important part in the building up of our State that we cannot overlook the fact of its importance as a primary production in maintaining us as a sound and prosperous country. It is well known that our Australian wheat commands a very high, if not the highest, place in the English market for an all-round wheat, and is much sought after for mixing purposes. Then we must grow wheat, but how are we to grow it to the best advantage? We all know, when we first rolled down the scrub and got a good burn and fair rains, it was not a difficult matter to grow wheat, and if our land would continue to respond as it does for the first two crops, there would be no need for us to look much further for a profitable undertaking. Experience, however, has taught us that those early results cannot be maintained by continual cropping with wheat. The ground becomes impoverished in the necessary wheat foods, so that wheat growing becomes unprofitable. Our chief object therefore, should be to make our ground more fertile every year. That cannot be done by sowing wheat, burning off the straw, and sowing wheat again, and so on, nor even by the best methods of fallow. The ground must have some form of vegetation returned to it, or it will eventually fail to produce a profitable crop. Nature will ultimately come to the rescue and grow us a fine crop of what is commonly called mustard, which, in my opinion, is not an unmixed evil. But we must grow the crop that will bring in the best return and still maintain our ground in good condition or leave it in a better state for wheat growing. That crop, I maintain, is oats. The man who grows the most oats first, will grow the most wheat last. These two cereals make the best combination, and I am satisfied in our mallee country, where oats have been grown, wheat will grow. The question has often been put to me 'what are you going to do with all the oats?' I contend that a man should not complain when he has feed. It is when he has none that the pinch comes. I should like to say here a little about harvesting oats. It is a well-known fact that if oats are left until ripe, which they must be if reaped, and there should come a windy day, there will be a considerable quantity shaken out. Therefore every effort should be made to cut with the binder, just before they are ripe. If the crop is sufficiently high you can cut a foot from the ground if you like, and then stack it ready to be threshed. There are several threshing machines on the market. The oaten stubble will burn after being cut with the binder. If the ground be sandy the oats require to be sown thickly, and you can follow on next year with a crop of wheat.

"This brings me to the other phase, that is, of stock raising, and it ought to be in the form of stock raising, because to buy stock in any quantity is almost prohibitive. First of all there is the horse. The farmer who does not take a pride in his horses will always be handicapped. Get the best you can, breed the best you can, and feed all the time, and oats are a splendid all-round feed. Every farmer should have two or more cows, but, if a man is a bachelor or a young married man, and has a thousand acres to clear and cultivate, it is useless to think of going in extensively for dairying. Where the family is large enough, with a liking for this class of work, there is no doubt about there being money in it. It behoves every farmer to establish a flock of sheep. Get the best you can afford. It is wonderful what good feeding will do, in fact, there is more in good feeding than good breeding. No matter how good a breed you get, if you do not feed properly it is no use. By starting with an ordinary animal, you can always improve. My idea is to get a line of ewes, after you have got the feed. Do not get the ewes first, and think you are going to get the feed after. I should like to suggest sowing an area, and allowing to carry say four sheep to the acre, according to the number you intend to purchase, in a suitable paddock with oats or barley. By this means you have feed for ewes that you could get to lamb early, say in April, if possible. I do not like to have ewes lambing in the cold and wet, and early lambs generally command a big price. This method saves hand feeding. Perhaps a little care may be necessary to see that they do not founder. I put ewes on a fair crop of unreaped barley, and it had no ill effects. I am no advocate for straw stacks for stock. A straw stack is good shelter, and stock will eat it if they cannot get better. The same remarks apply to cocky chaff, but remember if you want prime stock you want prime feed every time. Have a straw stack and save your cocky chaff by all means, but only to sell to the other fellow or to use in case of emergency. For instance, you may see a line of stores you could buy and hold if you have feed, even in the way of straw, but even so, it is far better to give them the very best. Therefore aim at securing a plentiful supply of feed, and things should go on all right.

"Sheep will eat what other stock will not, but I do not advocate keeping sheep as scavengers alone. They will go a long way towards keeping your fallow clean, but do not forget to use the cultivator instead of half starving your sheep to keep it clean. Fat stock always sell well. Sheep also distribute their droppings more evenly over the land, and therefore are to be preferred in this to other forms of fertilisation. They help to enrich the soil, they supply you with meat, and, taking into consideration the cutting up of the big estates whence our supply used to come, the country must look to the farmer to grow its wheat, meat, and wool."

Mr. F. Norton (Geranium) said that until they grew oats they would not grow profitable wheat crops. At Pinnaroo they could not grow wheat before they grew oats. Two farmers at Pinnaroo reaped 25bush. to the acre, after two crops of oats, and that was just double the previous yield. With oats and ensilage they could overcome all difficulties, because they could not rely upon early rains to grow early fodder. They could not solve the problem of mixed farming until they supplemented the feed by conserving fodder. Barley grew slowly. He found early wheat the most rapid grower, and it supplied more feed than anything except rye. If oats were sown in early March with 40lbs. of super. and ¾bush. of seed, they could have April, May, and part of June for putting in their ordinary crops. If they secured 18bush. to the acre the return at 1s. 6d. per bushel would be 27s. per acre, and they were growing on land which was not only giving them feed, but renewing the soil. He was satisfied that oats were the solution of the whole problem of mixed farming.

Mr. Gray (Claypan Bore) said that growing oats was the best method of overcoming the takeall difficulty. Oats thrived on sand lands where wheat did poorly. He had reaped 18bush. of oats from one sandhill, and only 3bush. of wheat from the next hill. Last season he got the best returns from the lands where oats had been grown previously. They could grow oaten hay for 25s. per ton, and it was worth £2 10s. per ton to feed sheep. He would like to hear the opinion of the Conference as to the effect growing barley had in improving the soil.

Mr. W. J. Spafford (Superintendent of Experimental Work) said that mustard, to which Mr. Ledger had referred, was a blessing in disguise, for if they had mustard they had to work. If they had mustard they could also grow kale. Plants of the same family would grow successfully. In that district it was not usually recognised that the land was comparatively poor, and the cropping capacity was growing less, because they were losing in organic matter. That could be returned to the soil by livestock, which also had the advantage of creating a new interest in life for the farmer. In time they would grow wheat, not every other year, nor every three or four years, but once every five years.

Mr. Sanders (McNamara Bore) said that with Algerian oats they got very little feed until October. Barley was practically the same.

Mr. A. J. A. Koch (Lameroo), referring to the shedding of oats, said that though the oats fell on the ground they were not always lost. Before the drought he had oats which would yield six to eight bags to the acre. The north wind came and they disappeared. He reaped only 3bush. to the acre. They put sheep in and they lived and fattened on the fallen seed, and when the first rains came he had beautiful feed.

Mr. Spafford said that the Cape oat was the earliest, and a great deal was grown in the South-East; but it was always prone to go down. It made very rapid growth from the period of germination. The Sunrise oat, which the Minister had mentioned, would, he thought, fill the bill. It grew like the white oat, and seemed like a cross between the white oat and the Algerian, and was very quick and vigorous. There had been practically nothing done with oats in South Australia.

The Minister of Agriculture said that he would see that experiments were carried out with the seed he had from New South Wales and Western Australia with the view of finding what would give the best results. It should be done at the expense of the State.

Mr. Henshaw Jackson, referring to feeding of sheep, said that it would pay to conserve the straw and cocky chaff and have a crushing machine on the farm. They could then make a mixture of cocky chaff or straw with ½lb. of crushed oats, which they could increase up to 1lb. per day per sheep, and they would get fat sheep.

Mr. Ledger said he would, as a final word, say grow wheat and feed your stock, and grow oats and feed your stock again. In regard to the suggestion of feeding crushed oats to sheep, he believed that pollard would be better.

## DAIRYING ON THE MALLEE.

A paper on dairying in the mallee was read by Mr. G. E. Gregory as follows:—"Mallee country is not the most suitable for dairying, but still a few cows on the farm are very profitable animals to have. The return from, say, six cows in 12 months will go a long way towards keeping the home supplied in living requisites, and if given a liberal quantity of feed during the dry time of the year they will return a handsome profit over and above the cost of the extra feeding. I find bran mixed with copra cake given with scalded cocky chaff is very good for milking cows. The chaff should be scalded some time before feeding. Scald the morning meal over night, and cover the box with empty bags to keep the steam from escaping. The steam softens the chaff. Then mix the bran and copra cake with the chaff, and feed to the cows either before or after milking is finished. I prefer feeding before milking, so that the cows shall be ready to go into the paddock as soon as the milking is done. The Holstein is a good cow for the farmer, being a heavy milker, a good creamer, and good for beef. It does not pay to keep a cow until she is old. When a cow reaches the age of eight years, the sooner she is disposed of the better—that is, looking at it from a milking point of view. A farmer may happen to have an exceptionally good milking strain in an old cow, and he may wish to rear some young stock from her. In that case it will pay him to keep her and get as many as possible of her kind. I intend doing my best to improve my herd by breeding from a good sire. There is another point the farmer should study with regard to dairying in the mallee, and that is he should have the cows to come in when the produce realises the best price. March is a good month to have newly calved cows coming in. They will milk well right through until Christmas, or even longer. Some cows will milk for 12 or even 18 months. I believe in milking young cows at the least, say, 12 months, or even 18 months, as they seem to make better cows afterwards. Cows, used with a certain amount of commonsense, are one of the best, if not the best, paying animals a farmer can own. By keeping cows the farmer can always have pigs, and by having pigs he can kill his own meat throughout the winter months, when meat is scarce and dear."

## DIPPING SHEEP.

On behalf of the Chief Inspector of Stock (Mr. T. H. Williams), Mr. Coleman drew attention to the provisions of the Stock Diseases Further Amendment Act, 1915. It appeared advisable that sheep owners in the districts which were affected by the provisions of that Act should know what they were required to do. Briefly, he would point out that the Act made it compulsory for every owner of sheep in the whole of the districts of Alexandra and Victoria, and all that part of the district of Albert lying to the south of the railway line running from Tailem Bend through Pinnaroo to the Victorian border, to dip all his sheep during the period between the first day of September of each year and the end of the following January in a poisonous powder dip. From the above it should be quite clear to all sheep owners in the district referred to, which, by the way, included Kangaroo Island, that if they persisted in dipping their sheep in non-poisonous dips, or so-called carbolic liquid dips, they were failing to comply with the requirements of the amending Act, and would be liable to prosecution for not having dipped their sheep in a poisonous powder dip within the dates specified. After the last day of January of each year all that the inspector of stock would have to do in the districts affected by the Act was to proceed against any sheep owners who had failed to dip their sheep, no matter whether they were free from lice or ticks or not. For the purpose of the Act, the districts were infected areas, where all the sheep were infected stock. No owner of infected sheep might leave or allow such sheep to stray on public roads, lands, commons, or reserves, nor might he leave any infected sheep travelling from place to place on roads, commons, or reserves. No person might remove any infected sheep from the lands on which they were kept or depastured without permission from an inspector of stock. No owner or other person might expose lice or tick infested sheep in any market, whether public or private. It might be as well to point out that any agent, acting on behalf of the owners of sheep found infected, was just as liable to prosecution as the owners. In conclusion, he sincerely hoped that sheep owners in the districts mentioned, and, in fact, in every place where sheep were found infected with lice or tick, would give that matter the very serious consideration it needed. It was a reproach to owners individually and collectively that there should be a heavy annual loss owing to their neglect to keep their sheep free of lice and tick. Clean, sound wool meant high values, and broken, stained, and weak fleeces, low prices.

Mr. E. Tillbrook (Monarto South) said that one dipping was not sufficient to kill lice. Sheep infected with lice should be dipped a fortnight after tailing, and again in January or February. Lice were more difficult to kill than tick. The first two or three sheep in the dip should go through again, because the mixture was not properly stirred up at first.

Mr. Winkler (Stock Inspector) said that sheep should be dipped twice.

Mr. Henshaw Jackson said that there was an obligation on anyone using powder dips to see that they were properly mixed. Unless powder dips were properly stirred a proper result could not be attained. Good soft water was essential. If the water were hard, it could be softened with caustic soda in the proportions of 5lbs. to

1,000galls. of water. Non-poisonous mixtures were of no use, and it was only waste of time and money to buy them. The sheep should be dipped whether clean or not, as the dip acted as a skin tonic, and a clean-skinned sheep was a healthy sheep.

The Minister of Agriculture said that all sheep owners, whether within the line defined in the proclamation or not, were compelled to dip their sheep if they were infected. He dipped his sheep regularly, because it had a good effect. If there were any parasites it got rid of them, and kept the sheep in better health. It firmed the wool, and prevented the dust getting down to the skin. The proclamation was under a new Act passed last session, and therefore directions would be sent out giving instructions how to dip.

Mr. Winkler said that the farmers should co-operate and construct a dip at the most suitable central place, instead of each constructing a dip of his own.

## SHORTAGE OF SHEEP.

Mr. Henshaw Jackson delivered an address on the shortage of sheep, and said that, in some quarters, he was regarded as pessimistic on the subject. People said that the recuperative powers of the back country were such that in a few years they would stock up again. He doubted it. The back country was not the back country that it had been Where were the countless millions of rabbits which had been all over the place, and what effect had they upon it? They knew that vast saltbush areas had been killed by disease. He could take them to hundreds, perhaps thousands, of acres, which were once covered with saltbush, but were now only scrub, with bits of stick. Plains which had been covered with grass were now only sand and rubbish. All the rain in the world would not bring the saltbush back or make the grass grow on those plains. In places they cut scrub and sheaoak to feed the sheep. The lambs this season would be fewer than ever, and the sheep were looking pretty miserable. The sheep left were mostly old sheep, whose time for breeding was pretty nearly out. He was firmly convinced that in future, in the numerical strength of sheep in South Australia lay the inducement which existed for sheep farmers to establish on their holdings permanent flocks. He had been told that if they had that they would have nothing but crossbred sheep, but what did it matter? It was not every district that was so situated as to run crossbred sheep and produce the class of lambs they expected from crossbreds, because they cannot produce the right kind of feed for the right kind of lamb. There they would have to depend on the Merino. It had been said that the Merino would not feed, but had anyone tried the experiment? If not, they should test it. He would undertake, if given 500 Merinos, that he would have them feeding out of his hand inside of a fortnight. People out of Adelaide were doing it as a business. They bought the sheep, fed them by hand, and turned them over to make a profit. The Merino sheep of South Australia—he referred to the sheep called the South Australian Merino, which came mainly from the Northern Areas—was a class of sheep which he did not think could be beaten in the Commonwealth. The frame was well grown, and it produced a valuable fleece, had a good carcass, and took a lot of beating. In those districts where crossbreeding could be satisfactorily undertaken—and they knew their own districts best—if they asked him what cross he preferred, he would say at once the Leicester and Merino. The Leicester-Merino was a sheep which produced wool of excellent quality. The Leicester itself was the finest of the long-wool English breeds, and it had quality in every line. It imparted all its good qualities in the crossbreeding, and none of its bad ones. It was a bit smaller than the Lincoln, but it was a good doer. They would live on an absolute minimum of feed. Four years ago, in Mount Barker, when there was not a vestige of feed to be seen, the sheep there were rolling fat. In regard to the position of breeding for fat lambs, he came to the Southdown, which had the finest wool of the English short-wool breeds, and its carcass was the plum of the market. He had nothing against the Lincoln, which did very well in rich bush pastures, such as those at Mount Gambier. In country of that sort, it would give a better cross. Whilst he advocated the Leicester, he would not say that it was absolutely the best. So far as tests which they had been making in New South Wales for a number of years went, from a wool and butcher's point of view, the Border Leicester and Merino cross was the best. So far as results in Australia went, the Border Leciester stood first, and the Leicester and Lincoln Merino crossbred was second, but there was not much between either of them. They could grow more sheep and better sheep in Australia than in any place in the world, and every farmer should have as many sheep on his place as it would carry. They would make more money if they sent the wheat to market on their farm in the form of feed for the sheep. Some said that it could not be done; but it was done in their own district. At Bookpurnong he saw 600 sheep being fed. He asked what the chaff cost laid down to the sheep, and it figured out at £1 2s. 6d. per ton, and that included an allowance for every operation from the turning of the land to putting the chaff in bags. It figured out, also, that the farmer was getting £1 16s. 8d. per ton more for chaff in that way than if he had sold it in the market at the then ruling rate of £3 per ton. He did not want to put them off wheat growing, but to make them combine it with sheep raising. It was worth while, even if they had only half a dozen sheep. Reliable experiments showed that 1,000lbs. of chaff would feed 1,000 sheep every day, and it would not take a man or a boy long to feed that 1,000lbs. of chaff to the sheep every day. He thought that the work might be done even by girls. If they kept their sheep in decent condition, they would be surprised to find what a little it took to maintain them so; but once a sheep got down, it required a lot of money to bring it back. If ewes were too fat, they would have a lowered percentage of lambs, but when they were in lamb they could be treated better, and when they had dropped their lambs they could not be treated too well. They should find out the type of sheep suitable to the district, and every man in the district should breed the same type, so that the district should always be able to send the same kind to the market. The great difficulty at present was to get sheep. As soon as they got them, they would be more valuable. Lambs on the market now realised from £1 to £1 10s., whereas formerly only 6s. to 12s. could be got. Japan was coming into the market for wool and mutton, and if China came into the market too, there would not be sufficient wool to give every Chinaman a waistcoat. If any of them had money to spare they should put it into sheep and feed them.

## DESTRUCTIVE DOGS.

Mr. P. H. Edwards (Pinnaroo) said that dogs were a serious cause of loss among sheep farmers. He knew of one case where a farmer had lost 50 sheep in the year through dogs, and had determined to abandon keeping sheep, because the losses from dogs were so great. He moved—"That this Conference recommends that steps be taken to so alter the 'Dog Act' as to give greater protection to flock owners."

Mr. H. Ledger (Pinnaroo) seconded the motion, which was carried unanimously.

## FODDER GRASSES.

Mr. F. W. Eime (Lameroo) said that they could grow clover on the sandy lands, as they did not get much wheat from them. He thought they might grow grasses for their sheep. He would be glad to know the best grass to grow.

Mr. Spafford said that it was a difficult matter to say offhand what grass should be grown. Last year they tried about 20 varieties, and they meant to do better this year. Imported grasses were the only ones they knew anything about under cultivation. Of those prairie grass was most likely to be suitable. It was doing remarkably well in light soils with some rain. It germinated early, and made good feed. Other good grasses were sheep's fescue and Bokhara clover. Rhodes grass was essentially a summer grass, and they had no summer rains. Silver beet was also a summer-growing plant.

Mr. Norton said that he had been experimenting, and he had had sufficient encouragement in the dry years to be satisfied that there were three or four kinds that would do well in that district, but whether it would pay, considering the price of seeds, he could not say.

Mr. Spafford said that if it was a question of producing fodder for the fields, lucerne stood alone. Three or four pounds of lucerne drilled in would give splendid results. In loamy, sodden soils lucerne stood alone.

## FUTURE CONFERENCES.

Mr. A. J. A. Koch (Lameroo) moved—"That the interests of the respective districts will be better served in the future by the subdivision of the present Pinnaroo and Brown's Well lines district, and that in future one Conference be held for the Pinnaroo district, and another for the district represented by the Brown's Well, Paringa, and Waikerie lines."

Mr. P. H. Edwards (Pinnaroo) seconded the motion, which was carried unanimously.

Votes of thanks were passed to the Advisory Board and the officers of the Department of Agriculture, and the proceedings terminated with the singing of the National Anthem.

## IMPORTS AND EXPORTS OF PLANTS, FRUITS, ETC.

During the month of July, 1916, 605bush. of fresh fruits, 13,476bush. of bananas, 18,343 bags of potatoes, 1,038 bags of onions, 6,849 packages of vegetables, and 195 packages of plants, seeds, and bulbs were examined and admitted at Adelaide and Port Adelaide under the "Vine, Fruit, and Vegetable Protection Acts of 1885 and 1910;" 84bush. of bananas (over ripe), and 10 bags of potatoes were destroyed. Under the Federal Commerce Act 432 cases of fresh fruits, 12,689pkgs. of dried fruits were exported to oversea markets. These were consigned as follows:—For London, 9,799pkgs. of dried fruit; New Zealand, 432 cases citrus fruit; 840pkgs. of dried fruit; and Canada, 2,050pkgs. of dried fruit. Under the Federal Quarantine Act 1,405pkgs. of seeds, &c., containing 240,172lbs. were examined and admitted from oversea markets; 2cwts. of cress were cleaned on account of weed seeds.

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| Mount Pleasant | † | — | — | Stockport | † | — | — |
| Mount Remarkable | † | — | 4 | Strathalbyn | † | 12 | 10 |
| Mundoora | * | — | — | Sutherlands | * | — | — |
| Murray Bridge | ‡ | 11 | 9 | Tantanoola | ‡ | 2 | 7 |
| Mypolonga | † | 13 | 11 | Tarcowie | 138 | 12 | 10 |
| Myponga | * | — | — | Tatiara | 168 | 2 | 7 |
| Myrla | * | — | — | Tintinarra | * | — | — |
| McNamara Bore | 154 | — | — | Two Wells | 144 | — | — |
| Nantawarra | ‡ | — | — | UraidlaandSummert'n | ‡ | 4 | 2 |
| Naracoorte | 166–7 | — | — | Waikerie | 157–60 | — | — |
| Narridy | † | — | — | Warcowie | ‡ | — | — |
| Narrung | * | — | — | Warrow | * | — | — |
| Netherton | 155 | — | — | Watervale | † | — | — |
| North Booborowie | * | — | — | Wepowie | 138–9 | 9 | 7 |
| North Bundaleer | * | — | — | Whyte-Yarcowie | 141 | — | — |
| Northfield | 143 | 5 | 3 | Wilkawatt | 160 | — | — |
| Orroroo | * | — | — | Willowie | * | 12 | 10 |
| Parilla | † | 7 | 5 | Wilmington | * | — | — |
| Parilla Well | 162 | — | — | Wirrabara | 139 | — | — |
| Parrakie | 155 | 2 | 7 | Wirrega | † | — | — |
| Paskeville | * | — | — | Wollowa | ‡ | — | — |
| Penola | ‡ | — | — | Woodleigh | 161 | 11 | 9 |
| Penong | 146 | 9 | 14 | Woodside | ‡ | — | — |
| Petina | * | — | — | Wynarka | ‡ | 9 | — |
| Pine Forest | * | — | — | Yabmana | 150 | — | — |
| Pinnaroo | 155 | — | — | Yacka | ‡ | — | — |
| Pompoota | 162 | 14, 28 | 12, 26 | Yadnarie | ‡ | 9 | — |
| Port Broughton | * | — | — | Yallunda | * | — | — |
| Port Elliot | † | 16 | 21 | Yaninee | 146–9 | — | — |
| Port Germein | 140 | 16 | — | Yeelanna | 150 | — | — |
| Port Pirie | * | 9 | 7 | Yongala Vale | 141 | 11 | 9 |
| Quorn | † | 9 | 7 | Yorketown | * | — | — |

* No report received during the month of August. † Formal report only received.
‡ Held over until next month.

## ADVISORY BOARD OF AGRICULTURE.

### Dates of Meetings—
### September 13th and October 11th, 1916.

# THE AGRICULTURAL BUREAU OF SOUTH AUSTRALIA.

**Every producer should be a member of the Agricultural Bureau. A postcard to the Department of Agriculture will bring information as to the name and address of the secretary of the nearest Branch.**

**If the nearest Branch is too far from the reader's home, the opportunity occurs to form a new one. Write to the department for fuller particulars concerning the work of this institution.**

# REPORTS OF BUREAU MEETINGS.

## UPPER-NORTH DISTRICT.

## (PETERSBURG AND NORTHWARD.)

### MORCHARD (Average annual rainfall, 11in. to 12in.).

May 20th.—Present: 13 members and four visitors.

IRRIGATION.—Every farmer should endeavor to secure a water supply sufficient to irrigate a few acres, urged Mr. Charles Longbottom in a paper on irrigation, in order to provide a supply of green fodder in the summer and fruit and vegetables, besides being an invaluable asset in time of drought. Useful engines which would pump 500ft. could be purchased at very low cost and very small consumption of petrol. At many places along the great creeks dams might be erected, and large quantities of fresh water impounded for irrigation purposes. Side wing walls might be erected to carry off the floodwaters, which might be impounded again lower down. If several farmers combined to irrigate a suitable spot good fodder might be secured for summer and early lambs successfully raised. Mr. J. W. Reichstein said that if artesian water could be obtained by boring in that district it would be very useful for watering small plots of fodder, lucerne, &c. A double action pump worked by an engine would give a reliable supply of water. Mr. B. S. McCallum said that a little irrigation should be done on every farm, if only surface water were run to suitable places, causing them to be well flooded. On such spots almost anything could be grown. Dams could be sunk in suitable catchment places if the holding ground were right, and the waste could be run by gravitation to the required area. Mr. G. Gregory said that a little irrigation could be done on every farm if the farmers would only put their minds to providing a good water supply.

### TARCOWIE (Average annual rainfall, about 15½in.).

June 14th.—Present: eight members.

MANURIAL TESTS.—At the experimental plots, each quarter of an acre in area, the subjoined results were obtained. The plots were fallowed on November 14th, 1914, to a depth of 4½in., sown with Fairbank wheat on May 28th, 1915, and harvested on December 24th, 1915. Rainfall 9in. On each of the three plots 60lbs. of wheat were sown, and the yields were as follows:—No. 1, 60lbs. of super., 15bush. 9lbs., value £3 0s. 8d.; No. 2, 100lbs. of super., 16bush. 2lbs., value £3 1s. 2½d.; No. 3, 150lbs. super., 20bush. 8lbs., value £3 18s. 3½d. The result was a justification for the larger quantity of super. especially as the wheat sown was a hay variety. It was decided to make further tests as to the quantities of manure during the ensuing season, with 100lbs., 150lbs., and 200lbs. of super. in conjunction with another variety of wheat. At previous meetings Mr. J. P. Smith read a paper on "Drenching and Slinging Horses and Cattle," and Mr. W. S. Bennett read a paper on "Co-operation."

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### WEPOWIE (Average annual rainfall, 13in. to 14in.).

July 22nd.—Present: nine members and one visitor.

BLACKSMITHING ON THE FARM.—A blacksmith's shop on a farm should be built of stone or iron, and measure at least 16ft. x 18ft., and be 8ft. in height, measurements which were sufficient to allow the entrance of any large implement for repairs, observed Mr. C. Pearce in a paper advocating that every farmer should erect a blacksmith's shop on his holding. The necessary equipment should comprise a blower, an anvil (weighing about 1½cwts.), a drilling machine, taps and dies, a small swedge block, a hack saw for cutting iron, tongs for flat and round iron, chisels, punches, hammer (about 2¼lbs., 1cwt. of bolts, nuts, and washers (various sizes), nails (assorted sizes), five or six pairs of horseshoes, 3cwts. or 4cwts. of flat and round iron, and a few bags of coal. It was often urged by farmers that they had no time for blacksmithing, but less time was consumed in the execution of repairs than would be necessary to take the implement to the blacksmith, wait whilst he repaired it, and then return with it. A blacksmith's shop on the farm would easily save the farmer £30 or £40 per annum.

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**AMYTON**, June 13th.—Mr. T. N. Mills read a paper on fencing, in which he advocated the use of wood and iron posts alternately, 12ft. apart. There should be six wires, the top two being barbed. The distances of the wires apart should be from the top as follows:—11in., 8in., 7in., 6in., and 6in. Red gum was the best wood to use, with No. 8 galvanized steel wire, which was less prone to rust in the post holes. Another effective rust preventive was to bore the wire holes with a ⅝in. bit, the bigger hole being less likely to clog with dirt. Iron T posts 1in. in width were better than steel droppers, which were easily broken.

**MORCHARD**, July 15th.—After the business of the annual meeting Mr. J. W. Reichstein, discussing the question whether it was advisable in harrowing green crops to use harrows with sharp or blunt teeth, favored the sharp tooth harrow. Mr. W. Toop also favored the sharp tooth, and said that it should be as light as possible. Mr. McCallum said that he had harrowed green crops thick with small weeds, and obtained good results.

**WEPOWIE**, June 14th.—Mr. Pearce read a paper on "Threshing."

**WIRRABARA**, July 15th.—After the business of the annual meeting two short papers were read by Mr. E. Hollitt, which were much appreciated.

## MIDDLE-NORTH DISTRICT.

### (PETERSBURG TO FARRELL'S FLAT.)

### BOOLEROO CENTRE (Average annual rainfall, 15.83in.).

May 12th.—Present: 15 members and two visitors.

Care of Farm Machinery.—When not in actual use, said Mr. J. M. Carey in a paper on the care of farm machinery, all machines or implements which had any woodwork in their structure should be kept under cover. The roof of the machinery building must be watertight, and enclosed on three sides, the open side facing south to avoid the summer sun. Where fowls were permitted to run at large the front of the building should be closed with wire netting. The wagon, tip-dray, &c., should be painted at least once every three years. The woodwork on the harvester and binder, especially the big wheel on the latter, if the rim were of wood, required painting with raw linseed oil or boiled oil every year after being put in the shed. Belts and all other leather work required a coat of neatsfoot oil annually. It was an excellent plan before starting the harvester to put the belts on and give them a liberal application of neatsfoot oil on the outside only. The belts gripped better with such treatment, and were less liable to slip. Harvesters or binders should be driven the same way as the drill had sown, for if driven across the drill marks on hard land it was severe on the machines, and nuts and other parts were more liable to work loose and fall off. All nuts should be kept screwed up tightly, and where there was any possibility of them working loose, they should be double nutted. Land to be cut for hay should be rolled, because it reduced the wear and tear of the binder, the condition of the land on which machinery was used having a great influence on the length of its life. It was a mistake to work with the chains of the harvester or binder loose, because they wore out more quickly. Oil should never be used on a chain, as it collected dust. Black lead soaked in water and painted on the chain minimised the wear. The crown and pinion of the harvester should be treated in the same way. It was advisable to purchase ploughs and cultivators from local manufacturers, because when they became worn or strained the man who made them was best fitted to mend them, besides adding improvements which lengthened their life. Drills should be lifted with a jack each season before being used, and operated by hand to ascertain if they were running freely. Kerosine should be used freely to remove rust and oil which had become clogged in the bearings. All obstructions should be removed from the distributors, and kerosine used freely to clear away fertiliser where it had become packed. All wearing parts on any machine required oil or grease, and if that were attended to breakage and delay would be avoided and the period of its usefulness prolonged. Mr. R. W. Stanton, in the course of discussion, said that reaping against the drill was not only hard on the machine, but caused considerable waste of wheat. Mr. W. Whibley said that it was his regular practice to use oil on chains.

## GLADSTONE (Average annual rainfall, 16in.).

June 17th.—Present: 13 members and one visitor.

Dairying.—In dairying the first consideration was feed, observed Mr. R. A. Humphris, in a paper in which that subject was discussed. For early winter feed plenty of good silage and early green fodder, such as barley, were excellent. A suitable herd should be selected, and only good, tested animals should be purchased. If a cow produced 10lbs. of butter per week on good feed, she was worth keeping, but it was also necessary to take into account the period of lactation. He had obtained good results from the Shorthorn-Ayrshire, but he preferred them crossed with the Jersey. A cow should keep up a good supply of milk for 12 months unless heavy in calf. For a "town" cow he preferred the Jersey, which gave a fair quantity of rich milk, and was easier to keep than other breeds. The calf should be allowed to run with the cow for the first day, because it tended to prevent teat blindness, which, in his experience more often affected a cow two or three months after calving than when recently calved. For the dairy, Shorthorns should be used, because, if they proved unprofitable as milkers, they made good beef. A cow should be dried off at least one month before calving.

## PORT GERMEIN (Average annual rainfall, 12.84in.).

July 22nd.—Present: 15 members.

Mungoose.—The Hon. Secretary (Mr. J. Stewart), in a paper, drew attention to the possibility of the introduction of this animal, and the likelihood of it becoming a pest. It was recorded as having caused considerable trouble amongst chickens in Western Australia. The writer then explained that the mungoose formed a well-defined group of small civet-like animals, with very long and generally uniform colored bodies and tails, and described the distribution of the species and various physical characteristics and habits. There was a danger, if it became acclimatised, of its developing a taste for lamb, and he therefore urged measures to prevent trouble in that way. Members generally agreed that strenuous action should be taken to prevent the introduction of such pests.

## REDHILL (Average annual rainfall, 16.79in.).

July 11th.—Present: 13 members and two visitors.

Provision against Drought.—Mr. M. M. Coffey contributed a paper, suggesting the adoption of a scheme for the preservation of surplus fodder for use in times of scarcity. He expressed the opinion that there was sufficient fodder produced on the individual farms during the years 1910, 1911, and 1912, to have carried over the drought period of 1913-14 every head of stock that the farmers held, and that fodder could have been conserved and utilised at a very small cost. In the absence of that provision, however, the results were disastrous. The farmers, he thought, seemed to consist principally of two classes in the matter of preparing for periods of drought, viz., those who could not, and those who would not. With the idea of obviating a recurrence of the recent drought experience he suggested that the State should purchase hay, say at a price of £3 per ton in times of abundance, and sell it to stockowners in times of scarcity at say £5 per ton. That, he thought, would obviate a good deal of waste, would ensure a market for hay, and eventually result in cleaner crops being produced. The increased selling price would act as an encouraging factor for each farmer to conserve his own requirements.

YONGALA VALE (Average annual rainfall, 13in. to 14in.).

July 21st.—Present: eight members and five visitors.

**Live Stock on the Farm.**—Mr. A. F. Dempsey read a paper entitled "Live Stock on the Farm," in the course of which he advocated the use of a medium draught horse for farm work, and for a harness hack a cross between the thoroughbred and a roadster. The foals should be well fed during the growing period, and if allowed to run for three years before being broken in great advantage would be gained later on. Sheep should be kept with Merinos as the foundation, crossed with either Lincoln or Shropshire, and a good, useful lamb would result. More attention should be paid to sheep raising, and with a little hand feeding larger flocks could be kept. Cows also yielded a good profit, but they should be well fed. When it came to stable feeding he found that cocky chaff and bran with a solution of molasses gave the best results.

BELALIE NORTH, June 15th.—After the business of the annual meeting, there was a discussion on the pickling of seed wheat.

BOOLEROO CENTRE, July 14th.—Mr. F. D. Brooks, after the business of the annual meeting had been finished, read a paper on "Co-operation." In a long discussion the prevailing opinion was that co-operation amongst farmers would not be a success.

BUNDALEER SPRINGS, July 13th.—Discussion took place on the subject of fallowing, Mr. Jas. Laurie advocating working to a moderate depth, afterwards loosening the subsoil with a cultivator, working whilst the soil was damp, but not wet, and as early in the season as possible. The majority present preferred shallow ploughing or fallowing with a cultivator, by which method a better germination of seed was secured.

HILLTOWN, July 7th.—Mr. A. A. Lehmann delivered an address on "The Selection of Brood Mares for Farm Purposes." Discussion ensued, members generally agreeing with the views expressed in the paper.

LEIGHTON, July 13th.—Mr. A. D. McDonald read a paper on "Notes on Farm Stock." Discussion ensued, and it was generally agreed that it was advantageous to feed sheep from troughs when feed was scarce. On the question of borrowing implements it was considered that a small uniform charge should be made, which would assist in the upkeep of the implements loaned.

MOUNT BRYAN EAST, July 15th.—After the business of the annual meeting had been transacted a discussion took place as to the best method of preventing sheep being fly blown. Mr. J. Thomas (Chairman) said that the most effective method was to spray them with sheep dip. A discussion then took place as to the best means of catching wild dogs.

WHYTE-YARCOWIE, May 15th.—Mr. E. J. Pearce read a paper on "Bookkeeping on the Farm," in which he advocated a certain amount of bookkeeping by every farmer if it were only for the purpose of making out income tax returns. If a diary were kept it would be very helpful. In a general discussion members agreed with the paper. On June 19th Mr. F. H. Lock read a paper on "The Need for Individual Economy." Mr. E. J. Pearce deprecated the waste of binder twine, which he thought should be made use of. Mr. G. F. Jenkins said he would like to find a market for petrol tins.

## LOWER-NORTH DISTRICT.

### (ADELAIDE TO FARRELL'S FLAT.)

### ANGASTON.

June 17th.

**Oil Sprays.**—"Practical results have shown that in the spraying of fruit-trees oil is very much more effective as an insecticide, and has more beneficial effects upon the tree, than kerosene," remarked Mr. George Sharp in a paper on "Oil Sprays." Experiments made on certain scale insects showed that it required a 1 in 10 kerosene emulsion to accomplish what a 1 in 40 oil emulsion would do. A probable reason for that was that kerosene was much more penetrating than oil, and instead of remaining on the surface of the tree or blocking the pores of the insect with a dense suffocating film, it soaked right into the bark. Oil remained on the outside of the bark, and its action continued for weeks after the spraying. In fact, the best work was often performed on the first hot day after the application, for it would then creep into crevices and corners, where it was impossible for the sprayer, were he ever so skilful, to force it. A heavy spray of oil on peach trees started twig growth right down to the fork of the butt, and pear trees, which were subject to a mysterious disease which caused the bark to crack and lessened the growth, eventually rendering the tree useless, had been treated with heavy sprays of oil emulsion, and the results had been very satisfactory. As an insecticide oil had great advantages over every other spray or gas, in that it killed every class of insect. There was no mite so closely hidden that it could not be reached, and no scale so well protected that it would not be penetrated. Spraying with oil had had the effect of causing trees to blossom a fortnight before trees which had not been treated, and it had also been noticed that trees treated with oil, at that time of the year, set their crop more heavily than unsprayed trees.

## JULIA (Average annual rainfall, 18in. to 19in.).

April 29th.—Present: eight members and four visitors.

Cutting Hay for Header.—The cutting of hay for the header would be of little advantage, on a small farm, said Mr. C. Nash, in a paper dealing with that subject. It required to be adopted on a large scale, which would mean co-operation among the farmers. Up to the present co-operation had not proved practicable, and the outlay in machinery was too great for a small farmer to cope with. The best time to cut for the header was when the straw was commencing to turn a golden color, because at that stage the sap contained in the straw was sufficient to ripen the grain. The binding should receive every attention, as the sheaves received a good deal of handling. After heading, the straw was a very valuable fodder for stock in periods of shortage, otherwise the straw required the addition of a fair percentage of seasonable hay. For heading purposes tough varieties of wheat were the best, otherwise there would be considerable waste of grain during carting and stacking owing to the temperature. Mr. T. Prior, discussing the paper, said that he had installed a thresher last season at a cost of £32 10s., and he erected a 20ft. elevator at an outlay of £8. He cut 50 acres of crop, and the balance was harvested. The returns from the thresher were slightly better than from the harvester, and he had 80 tons of splendid straw in stack. The stock ate readily the rough chaff from the header, preferring it to going into a fresh stubble paddock. Six men were necessary to work the thresher, and they kept two teams carting from the paddock. Their best day's work was eight loads of hay, yielding 50 bags of wheat. Threshing was slightly more expensive than harvesting, but he calculated that the straw in the stack did not cost him more than 8s. or 10s. per ton.

## JULIA (Average annual rainfall, 18in. to 19in.).

July 15th.—Present: 11 members and five visitors.

Economy in Feeding Horses.—Mr. T. Prior deprecated over feeding horses. When a horse had been spelling, its digestive organs would be upset if it were put at once on full feed. It was better to feed sparingly at first, even if the horse were kept somewhat hungry, and the ration should be gradually increased. All coarse hay should be chaffed, as it would be noticed that the hard, dry butts were generally wasted. Sufficient food for the whole day should not be given at once or the horse would not do well. It was well to give the animal just as much feed at once as it would clean up. Horses would keep in good working order if fed with judgment, either on long hay, not too coarse, or wheaten chaff with pollard or crushed wheat. The animals should always have a spell for a week or two in the spring.

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## MINTARO.

July 15th.—Present: 28 members.

Sheep on a Small Farm.—A good sheep-proof six-wire ring fence with posts or droppers 8ft. or 9ft. apart was the first essential of keeping sheep on a small farm, observed Mr. H. Schunke in a paper on that subject. In the construction of such a fence he preferred wooden posts about 24ft. apart with two light iron posts between. It would be necessary to subdivide that area into small paddocks, but the dividing fences need not be of a permanent nature, wire netting and stakes answering the purpose very well, and being very easily erected. Wire netting of the largest mesh would be satisfactory, but he preferred a 2in. mesh, because it lasted longer. Wooden stakes might be used, but, if unprocurable, light iron posts should be obtained. They should be placed about half a chain apart, and the netting should be tied to them top and bottom with binder twine if the fence were only required temporarily, but if for a longer period lacing wire should be used for tying. If large stock were turned into the paddock a barbed wire should be run along the top of the stakes. In determining what sort of sheep should be raised the farmer had to decide what market he proposed to cater for. It would not pay the small farmer to breed for wool, and the most profitable method was to fatten lambs for market. He preferred the large-framed, plain-bodied Merino ewe with a good fleece, long in the staple, and it would pay to buy good young ewes from some reputable breeder, the heavy fleeces at shearing time making up for any extra expense in the original outlay. Those ewes should be mated with a Shropshire ram—a good, robust animal, with plenty of bone. It would be necessary to have green feed ready for the lambs when they arrived, and a small paddock sown with barley would provide sufficient picking for the young lambs until there was sufficient grass. Another and perhaps better plan was to buy store lambs after shearing; in normal seasons they could be purchased at a lower cost than the farmer could breed them. For that purpose a small paddock would be required in which to keep them going until after the harvest, when they could be turned on to the stubble, and would soon fatten if the right kind of lamb had been secured. Even if cheaper at the moment, stunted or undersized lambs should not be bought, experience showing that it was best to secure good well-grown lambs which fattened quickly, and were eagerly competed for. Even on the smallest farm it should be possible to keep a few ration sheep, and a small paddock should be set apart for that purpose. After shearing a line of cull ewes not too old, might be picked up at the sales. The more produce grown on the farm fed to stock the better. If a large amount of produce were fed to sheep the soil was not being robbed or impoverished to anything like the extent which obtained by carting produce to market, which was in reality removing so much fertility from the soil, and it had to be replaced by superphosphates and other manures, thus incurring the double expense of carting produce to market and carting back manures. But if produce were fed to stock they could be driven to market and cartage saved. It was often more profitable to feed oats to sheep than to sell the grain at the price ruling. If that were done paddocks affected with takeall could be sown for oats, thus cleaning the land and providing a splendid lot of sheep feed. He would also grow Grey Dun field peas, which were the best fodder grown for fattening sheep. Mr. C. D. H. Wright considered that it was best for farmers to breed their own lambs, because those bought in the market might have had a check. Crossbred sheep were very bad on fences. Merinos, if bred from good stock, were the best. Mr. D. Kelly said that the present time was favorable for the breeding of as many lambs as possible. It paid to fatten sheep on hay, but it was difficult to feed to them, especially in wet weather, when they wasted a lot by treading it into the ground. It was better to feed them on chaff, using bag feeders stretched between trees or posts. Merinos were the best sheep for a small farmer to breed. Mr. R. Kelly found barley a very good feed for sheep. He had kept 30 Shropshires for six weeks on three bags of barley and plenty of water. Mr. A. Rowe said that peas could be successfully grown with oats, and they could then be easily harvested and fed to stock in the form of hay.

## NORTHFIELD (Average annual rainfall, 19in.).

June 6th.—Present: six members.

How to Make Land More Productive.—Declaring that land could not bring forth continuously without strength and renewed strength Mr. D. Rowe, in indicating some methods by which land might be made more productive, emphasised the fact that land required nutriment, recreation and rest. Food could be supplied in the first place by a rotation of crops, such as barley, oats, peas or different kinds of wheat, and secondly by manures, of which farmyard manure proved one of the best foods for the land. There were different methods of applying the manure. When the hay crop had been taken off, a moderate dressing, covering the soil, without any bare patches should be applied. Then the ground should be ploughed lightly, just enough to cover the manure. After the first rain it should be harrowed and fallowed early in June, if there had been reasonable rains. Such a method would have a beneficial effect on the crops for 20 years or more. After the first crop, 70lbs. or 80lbs. of super. to the acre should be applied, and afterwards 1cwt. sown with the seed. The second method was to top dress the crop in the latter part of June, spreading the manure over the ground until the crop had been covered. That course would prove very beneficial to future crops. A third method was to spread a light coat of manure, when fallowing, and then sow ½cwt. of super. per acre with the seed. The last method was suitable to small holdings. A two years' bare fallow would clean dirty land if overrun with soursobs and other objectionable weeds. It would also insure a good yield in a dry season and prove beneficial for future cropping. Large holdings (not new country) might be farmed on the three years' system, that was—rest or graze one year, fallow the second year, and crop the third. After many years of cultivation a seven years' rest by grazing would prove very refreshing to the soil, especially if followed by good seasons. Mr. H. Galway found that farmyard manure and super. produced good results. He believed in the two years' fallow, but did not recommend it on small holdings. Mr. W. J. Dall doubted the profitableness of the two years' fallow in that district, where land was so valuable. He preferred skim ploughing to bare fallow, and with a light dressing of manure it would pay better to grow grazing crops. As an instance of the value of stable manure, he said that 28 years ago, in the North, he had given an unsatisfactory 15-acre paddock of rough land a heavy dressing of stable manure and the beneficial results were still plainly visible. Mr. Rowe, replying to arguments, said that the two years bare fallow paid best on small holdings. From an area of 20 acres, which was given two years' bare fallow, he realised as much as a neighbor garnered from 140 acres. In another case, from 47 acres, after two years' fallow, he secured results which equalled the returns which a neighbor obtained from 200 acres.

TWO WELLS (Average annual rainfall, 16.36in.).

June 19th.—Present: six members and one visitor.

Farm Management.—''Carefulness is the first essential in farm management,'' was the maxim laid down by Mr. G. M. Gordon in a paper dealing with the management of the farm. All implements and machinery should be ready to use when required. The horses should have the best attention and care in regard to their feed, not only when working, but before that time arrived. When the work had been completed the implements should be cleaned and put away under cover. All fences should be kept in proper order. Stables should be erected to the south-east of the homestead, because the wind very seldom blew from that direction. Stable and implement sheds should be separate because of the danger of fire. Stables should be built of stone with iron roofing, which was as cool as straw, with proper ventilation. Trees should be planted around the homestead to improve its appearance, and they should be planted in the paddocks to provide shelter for stock. Every farm should produce its own hay, wheat, fodder, mutton, milk, butter, bacon, poultry, and eggs. Mr. H. W. Kenner said that all grease should not be cleaned from implements and machinery before being put away, but should be left on so that the dust and rust might be kept out. All machinery, however, should be well cleaned before being put to work. Mr. Pratt said that 500 acres could be kept in ideal order by the employment of one good man, but it was very difficult to keep 1,000 acres in order, even with three men.

MALLALA, July 12th.—Mr. A. V. Nairn read a paper on war, and said that the farmer's occupation should be a ceaseless war on such enemies as rabbits, foxes, sparrows, starlings, yellow star thistle, and the Bathurst burr. Members expressed the opinion that farmers should co-operate occasionally and spend a day in hunting up and destroying the various enemies.

ROSENTHAL, July 11th.—Mr. G. Quinn, the Government Horticultural Instructor, delivered an address on ''The Principles Underlying Pruning of Fruit Trees and Vines.''

SALISBURY, July 4th.—A visit was paid to the Parafield Poultry Station, and then a meeting was held, at which formal business was transacted.

TWO WELLS, July 15th.—After the business of the annual meeting Mr. Valentine (Victoria) delivered an address on dairying. He said that milking machines would not spoil the milking cow if properly used. Cows of his which had been milked with the machine for five years had not deteriorated in the least. The machines could do no harm if properly used, and those people whose machines had not been a success had not given them the proper attention.

## YORKE PENINSULA DISTRICT.

### (TO BUTE.)

DOWLINGVILLE, July 14th.—Members discussed whether the plough or the cultivator was the better implement for working the fallow. The majority favored the latter in that district, because it covered the ground more expeditiously, and the land was not so liable to drift after the cultivator, because it left a rougher surface.

## WESTERN DISTRICT.

### GOODE (Average annual rainfall, 12in. to 13in.).

May 17th.—Present: nine members.

Water Conservation.—In a paper on the best method of conserving water Mr. W. Burner recommended the construction of tanks with solid walls of masonry. The so-called concrete tanks were chiefly composed of dirt and lime, and repairing and tarring were a constant necessity. He advised every farmer to be his own mason, no great skill being required to build a solid wall of limestone. The first tank for an amateur to essay should be a circular one, because by using a trammel in the centre he could keep his work in order. If he built to the trammel he could not go wrong. To set out a round tank 16ft. in diameter, a round pin should be driven in the centre of the site, and a piece of wire 8ft. in length attached to it. With that a circle could be drawn, which would give the circumference of the tank. In excavating the tank should be kept perfectly vertical. Before commencing to build the bottom should be thoroughly rammed, in order to give a solid foundation for the wall. Care should be taken that the first course of stone went right through the wall, and was faced up carefully to the trammel, because a correct beginning would avoid considerable trouble. The mortar should be composed of two parts sand and one of lime. It was essential to keep the face of the work clean, and not cover it up with mortar, which should only be used to stop up joints. The cement should have a clean, solid face to adhere to, and when once it set to the clean stone, nothing would remove it. In building, the stone should not be edged and the hard, flinty face should not be turned with the face outwards, as the cement would creep, and come away, leaving a hollow patch. When bedding stone, the tail should not be propped up with mortar, but spalled up with flat pieces. Everything should be put down solidly with the hammer, and the lime should be screened.

### MOUNT HOPE.

July 21st.—Present: seven members.

Care of Harness.—Only the best harness should be bought, declared Mr. H. J. Myers in a paper on that subject. It would cost more, but it was cheapest eventually. Special care should be taken to see that the collars fitted well. A closely-fitting collar would last longer than a loose one, because there was less wear and tear. Each horse should have its own harness and a separate peg should be provided for each horse's collar and winkers. A good harness room was an essential. If the room were free from dust, and the harness were oiled twice a year, it would last a lifetime. Frequently he had seen the collars left on horses when they were feeding, but that was a mistake because it had the effect of irritating the animals and damaging the collars. Back bands were usually left in the paddock with the implements, and required a liberal application of oil to keep out the wet. Discussing the question of poultry raising Mr. J. Winstanley said that White Leghorns were the best egg producers. He preferred barley to wheat as a food for fowls, because it was not so fattening. Mr. R. Myers said that it would pay farmers to feed a larger proportion of their crop to poultry. Chicks should be hatched in order to lay early, and catch the winter egg market. Mr. T. Speed said that fowls should be given soft mash in the morning and hard grain in the evening.

## PENONG (Average annual rainfall, 11.93in.).

June 10th.—Present: seven members and one visitor.

**Blacksmithing on the Farm.**—Economy and convenience were the two leading points urged by Mr. J. Oats in his paper "Blacksmithing on the Farm." He urged that a blacksmithing outfit not exceeding £15 or £20 in value, would provide all that was necessary. Many repairs could be effected on the farm in a few minutes if the appliances were at hand. Possessing necessary equipment, it would often be more economical and convenient to bring the blacksmith to the farm, instead of taking the work to him, especially when there were many horses to be shod. Small bellows were a mistake, and he recommended a 36in. size. An anvil (not less than 1cwt.), an upright drill, a good heavy vice, and taps and dies were essentials in a farmer's blacksmithing outfit. A few lengths of assorted sizes of round iron, for making bolts, and a few bars of flat iron of the sizes in use on the implements for repairing purposes, should be kept in stock. Mr. W. Saunders considered blast furnaces more powerful, and less likely to get out of order than bellows. Mr. W. Place preferred the blast furnace, though the cost was double that of bellows.

## PENONG (Average annual rainfall, 11.93in.).

July 9th.—Present: five members.

**Farming.**—Success in farming mostly depended upon the farmer and the nature of his plan, postulated Mr. W. L. Place, in a dissertation on farming. Land which was recognised as old land should not be cropped, he said, more than two years in succession, but about four crops might be taken from new land. The fallowing of grass land, which had rested for two or three years, was preferable to fallowing the previous year's stubble. By ploughing in green herbage humus was being put into the soil, but, in ploughing in stubble, there was a tendency to permit the moisture to escape. A commencement should be made with fallowing about the middle of July, and it should be finished at such a time as the nature of the season suggested. Sheep were profitable on the farm as they could be kept on the land whilst fallowing was in progress, and, when that had been completed they helped to keep down the rubbish. Merino sheep were best, because a five wire fence was sufficient to keep them in. Large iron sheds provided the best catchment areas for water. Four such structures, each 60ft. x 30ft., would with an average rainfall, conserve enough water to provide for the dry spells. Tanks of about 120,000galls. capacity would be ample for the amount of roofing indicated. With such an equipment, there would be no danger of floodwaters filling the tanks, nor would they be exposed to the menace of drift sand. Every farmer should raise his own horses, the class he preferred being a cross of the Suffolk Punch and Clydesdale, because they were very active, and possessed the requisite weight. Cows, pigs, and poultry should always be kept, because they provided dairy produce for the home, and something over for the market if managed in the right way. Mr. O. J. Murphy considered that surface tanks were necessary as well as roof tanks. Iron roofed sheds, with iron or cement tanks were advisable in new areas in preference to surface tanks, especially in sandy country. The best water runs could be chosen after the tracks had been made, and a portion of the land cleared when surface tanks could be put down.

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## YANINEE.

June 17th.—Present: six members and three visitors.

**Fertilisers.**—Mr. Cook (Manager Experimental Farm, Minnipa) contributed the following paper on this subject:—"The use of artificial fertilisers is to-day practically general throughout countries with advanced agricultural methods, and is adopted as a means of enriching soils in the various foods for plants. Grains, livestock, food, &c., sold off the farm remove a certain proportion of substances from the soil, and it is to make good these losses, or removals, that fertilisers are applied. In some countries, as in parts of this State, soils are found that doubtless are very rich in many plant foods, but in one or more particular types of essential foods they are very deficient, so much so that certain crops that require these particular classes will not produce payable results unless recourse is had to fertilisers. It behoves farmers not merely to produce a first class crop, but to look well ahead, so that the land will always be in the condition to produce first class crops, and to do this we must always aim to keep the soils enriched, and necessarily adopt a comprehensive use of fertilisers, together with adequate tillage methods. As good tillage is looked upon as having fertilising capabilities of no small order, we must on no account ignore any cultural methods, and put too much reliance on our applications of fertilisers, as the one operation is the complement of the other There are 10 essential elements that enter into the tissues of plants, and are contained in practically all varieties of plants in varying quantities according to the species of plants. For instance, cereals contain a relatively higher proportion of phosphorus than other plants, potatoes and onions contain a greater proportion of potash, turnips a larger percentage of sulphur, and clovers a larger amount of lime or calcium. The 10 essential elements of plant growth are carbon, hydrogen, oxygen, nitrogen, sulphur, phosphorus, potassium, magnesium, calcium, and iron. Other elements, such as sodium, silicon, and chlorine are generally found in plants, but they are not essential to their growth. Of the essential elements, all but the first mentioned are obtained by the plants from or through the soil, and it is these that we need to have in an available form and in close proximity with the plant's roots. Hydrogen, oxygen, and nitrogen come from the atmosphere, and it is cultivation that materially helps to supply these. Nitrogen is fixed in the soil by bacteria, and a climate such as we enjoy is very effective to the life of these organisms, so that, unlike very wet countries, we shall scarcely, if ever, need to apply artificial nitrogenous fertiliser to our crops. Our nitrogen supply we must look at indirectly and husband a good supply of humus in the soil as food for bacteria. For this there are a number of points to observe, but space will not permit of their discussion in this paper, suffice it to say, that it is as well to look upon all fires, scrub or stubble, as necessary evils. With regard to the other six elements, namely, sulphur, phosphorus, potassium, magnesium, calcium, and iron, or ash constituents of plants, these are found in varying proportions in practically all known soils, but in various compositions and stages of availability for use by the plants. In fact, iron, magnesium, and sulphur are found in such small quantities in plants that practically never has it been necessary to apply these to a soil, our cultivations being the means of sweetening the soil and providing these elements in sufficient available forms, that is, forms that are readily dissolved by the soil moisture, and are thus able to be utilised by crops. With regard to calcium or lime, this is usually in sufficient quantity in soils to satisfy the plants as food, but it is frequently found necessary in some lands to apply it as a means of rendering other elements into available plant food forms. In this district it is highly improbable, except in perhaps a few isolated cases, that we shall even need to consider this element as being in insufficient available quantity. Potassium is present in most South Australian soils in sufficient quantity, and in districts like this, where lime is not wanting, it can usually be had in sufficient available form for the growth of most crops. At any rate, for the present, it is not one that we need to consider. Lastly, we come to phosphorus, and this is the one that affects us, as wheatgrowers, at the present moment, and that I purpose considering in some detail Most soils lack a sufficiency of phosphorus, and this is especially so in Australian soils, as reports from all experimental fields in the Commonwealth denote a marked payable increase in yields by the application of phosphatic fertilisers. With regard to our own district soils, to my knowledge, no analyses have been made of them, but Mr. Jack, the Assistant Government Geologist, in his geological report of this country, publishes analyses by Mr. Chapman, Departmental Analyst and Assayer, of the various granite outcrops and felspar porphyries of the Gawler Ranges, from which our soils have been formed. On perusing these we notice phosphoric anhydride is present in the rocks in varying quantities from ·04 per cent. to ·09 per cent., so we can safely expect our soils to be rather poor in phosphorus. A soil that contains .1 per cent. of phosphoric anhydride, *i.e.*, 1lb. in 1,000lbs. of soil, or 3,250lbs. per acre, is considered rich in phosphorus, whereas one that contains less than ·05 per cent., *i.e.*, ½lb. per 1,000lbs. of soil, or 1,625lbs. per acre, is considered poor in phosphorus. Of the supply of phosphoric anhydride in a soil, we can reckon on no more than one-tenth being immediately available to plants. From the above figures it behoves us to foster our phosphorus supply and endeavor to apply sufficient phosphate fertiliser to make good the quantities of phosphorus removed from the soils in produce. Undoubtedly, there is some available phosphorus present in the soils, but a good farmer would tend to increase rather than deplete this supply, and it is only by actual practical experiments that the most payable application can be decided, and it is well for every farmer to experiment on these lines. Let us consider phosphatic fertilisers under the following headings:—(1) The value of various types on the market, and hence the best quality phosphatic manure to apply; (2) quantity to apply per acre; (3) when to apply. (1) With regard to the quality of phosphatic manures, quite a large number of brands and classes are advertised and put on the market by the various firms as superphosphates, bone supers., bone dust, guanos, slags, and a host of special manures. The quality of these is ascertained by their chemical composition, which we usually find nowadays branded on the bags as so much per cent. water soluble phosphate, so much citrate soluble, so much acid soluble, and possibly a small quantity of nitrogen or potash is also claimed to be present in the manure. These terms of different classes of phosphates are the recognised commercial terms adopted for the sale of these manures; but, strictly speaking, they signify the quantity of phosphate rock rendered soluble. For instance, consider a superphosphate advertised as containing water soluble phosphate, 30 per cent.; citrate soluble phosphate, 2 per cent.; and acid soluble phosphate, 3 per cent. This means that 30 per cent. rock phosphate or acid soluble phosphate has been rendered soluble in water, and 2 per cent. of rock phosphate has been rendered soluble in a weak acid solution, such as citric acid, whilst 3 per cent. of rock phosphate remains practically untreated chemically as crushed or powdered rock phosphate. Of these three forms of phosphate, the first, water soluble, is of most value to us. A beneficial result has been obtained with the other two forms in wet countries, such as New Zealand; but in drier countries, especially where soil contains plenty of lime, the water soluble form is much more beneficial. The chief reason of this is that the water soluble is more readily available for use by the plants, whereas the less soluble phosphates have to be further acted upon by weathering actions, and by the weak acids of the soil before they are of use to plants as food. Further, these forms of phosphates are constructed of the element calcium, and the phosphoric acid anhydride. The acid soluble phosphate consists of three parts calcium to one of phosphoric anhydride, the citrate soluble consists of two parts calcium, and the water soluble consists of one part calcium to one part of phosphoric anhydride. It is obvious from this that the water soluble form suits us better, as our soils already contain fair quantities of calcium, and it is, therefore, inadvisable to fetch more from other parts, and at the expense of phosphate which we need. Hence the superphosphate containing the largest quantity of water soluble phosphate at the lowest price, provided it is free running, is the one that would pay best to secure for this class of country. Let us instance one or two manures on the market, and compare their actual phosphate values. Firstly, the one referred to above and advertised as a special hay manure: 1cwt. of this manure contains approximately 17½lbs. phosphorus, 15lbs. immediately available to plants and 2½lbs. not at first available. For this, together with ½ per cent. nitrogen, the vendors ask the price of £4 17s. 6d. per ton, or 3.3d. per lb. phosphorus. Ordinary 38 per cent. mineral super. contains only water soluble phosphate, and 1cwt. contains approximately 19lbs. phosphorus, the price of which is £4 5s. per ton, or 2.7d. per pound phosphorus. Of late years higher per cent. water soluble phosphate supers. have been on the market, reaching as high as 45-47 per cent.; 1cwt. of such would contain approximately 23lbs. phosphorus anhydride, and price asked was £5 per ton, or 2.6d. per pound $P_2o_5$. Undoubtedly the last is the cheapest, provided the super. runs freely through the drill, and 90lbs. of it is equal to 1cwt. of 36-38 per cent. water soluble phosphate super. This means a large save in freights, and affects the farmers on this Peninsula more than perhaps on the mainland, and farmers should consider a position where freight is reduced by one-fifth, and be better advised to spend the one-fifth thus saved in the extra purchase of phosphate. It is unfortunate that for every pound of phosphorus we give our soils we necessarily also have to import and apply 4lbs. of other substances; but this is the most economical method at present within our knowledge. (2) In considering the quantity to apply per acre for the wheat crop we can but discuss the phosphatic requirements of wheat, and also consider results obtained in other parts of the State and Commonwealth, until such times as we have experimental results in our own district. Professor Perkins, in an interesting address some time ago, quoted that a 20-bush. crop of wheat would absorb 18.9lbs. phosphoric anhydride per acre, and that 1cwt. of 36-38 per cent. super.

contains 19lbs. phosphoric anhydride, therefore 1cwt. 36-38 per cent. super. puts into the soil sufficient phosphorus for a 20-bush. crop of wheat. From this we see that to keep our soils well supplied 1cwt. dressing per crop of 36-38 per cent. super. will not be too much, as we all hope to produce at least 20-bush. crops. The average dressing for the State of South Australia of late years has been about 80lbs. super. per acre. At Roseworthy, Professor Perkins, over a period of 10 years demonstrated that 2cwts. super. dressings per acre gave the best return; but this was gained by the increased sheep carrying capacity of land as well as by the grain products. At Saddleworth, over a period of 11 years, Mr. Coleman has shown that 1cwt. of bone super. gave an average annual value increase of £1 12s. 8d. over no manure, and 1cwt. mineral super. gave an average annual increased value of £1 8s. 7d. per acre over no manure. In Victoria at three experimental stations, over a period of the last three years, the average net profit gained over no manure for ½cwt. super. application is 16s. 6d. per acre; for 1cwt. super. £1 0s. 8d.; and for 2cwts. 17s. per acre. This is for wheat crop alone. New South Wales also reports good results from super. applications, and notice in their dry low rainfalled Western district they use rather light dressings of super., down to as low as 37lbs. per acre; but this is in very light rainfalled country, and where crops rarely exceed a 10-bush. average. (3) When to apply.—By applying super. with the wheat seed it undoubtedly gives it a good strong initial growth, and this is very important, as a good start means a lot. The root hairs have not to hunt for their phosphate, but have it close at hand, and are, therefore, able to get well to work on the super., so long as there is sufficient moisture in the soil. Any method that tends to hasten growth is an advantage, as our summers are so liable to set in early, hence do all to keep sufficient available food in sufficient proximity of the roots of our crops.'' A number of questions followed the reading of the paper. The objection to burning stubble, Mr. Cook explained, was that it destroyed humus. No harmful effect should follow the application of 1cwt. per acre dressings of superphosphate in that district. Early wheats would be found most satisfactory. He advised grubbing the stumps in preference to allowing them to remain in the ground. Ploughing should be to a depth of 2in. or 3in. if the seed were sown directly afterwards; but on no account should the depth of ploughing exceed 4in. or 5in. In the event of a crop being sown with a fair dressing of super. and failing, it would not be necessary to dress the land with such a large quantity the succeeding season, as the value of the first dressing was not lost.

## YANINEE.

July 15th.—Present: 11 members and three visitors.

Fencing.—In a paper setting out the best methods of fencing, Mr. C. C. Tainsh said that in that district there were four classes of timber which could be suitably used for posts, namely, titree, king mallee, pine, and bulloak. Titree posts would last the longest, but pine or bulloak made a neater fence. Posts should be 5ft. 8in. in length, 3in. in diameter at the top, and should be set 1ft. 8in. in the ground. Straining posts should be set 3ft. in the ground and rammed well. Corner posts should be sighted a little out of the line to allow for pulling in. A stay or a strut about 8ft. in length should be used for the straining post. One end of the strut should be bedded in the ground about 8in., and the other end let into the straining post, not more than half-way up. If it were put in more than half way, the strain of the wires was likely to lift the straining post up, especially when straining up hill. Sight sticks should be about the same height as the fence, and not too far apart. If the fence were for horses or cattle three wires were needed, two barbed, and one plain, the latter being at the bottom. The top wire should be about 2in. from the top of the post and all the wires should be about a foot apart. Wire should not be overstrained, because it would not keep tight, and was easily snapped. The longer the strain the better, as it diminished the tendency to overstrain, and would keep the wire much tighter than a short strain. In fastening up the wire it was best not to fasten with wire around the posts, but to use good strong staples, which should not be driven in too far, always leaving room for the wire to run easily through them. If wire were fastened firmly to the posts and stock happened to charge it, the wire would snap, but if left to run free it would give with them at first but the recoil would throw them back again. For sheep-proof fences the posts should be 12yds. apart with three wooden droppers between. The droppers should swing clear of the ground, the posts should be bored, and the wires fastened to the droppers with staples, allowing the wires to run free. Six wires, five being plain and one barbed (on the top) would make a very good sheep fence.

Mixed Farming.—On a moderate scale mixed farming was a profitable, and in most cases, a reliable pursuit, premised Mr. H. T. G. Dunn, in discussing that aspect of agriculture. Financially, and in the matter of comfort, the adoption of mixed farming, was ahead of the growth of wheat and other cereals. Wheat should be grown for the production of wheat only, that was to say, that the proceeds of the grain should be used for procuring the necessary appliances, such as implements, fencing material, and other useful and necessary articles required by a farmer. The produce of the livestock should almost, if not completely, supply the household requirements. Where possible, no farm should be without 50 or 100 sheep, or even more, where conditions would allow. The killing of a sheep occasionally meant pounds in the pocket of the farmer, as it did away with the meat bill, a serious consideration at present rates. In addition to that there were the lambs and the wool to be considered. The number of sheep to be kept on a farm should be determined by the quantity of water available. All the water possible should be conserved in order to provide for the stock when dry spells came. When there was a failure of the wheat crops the wool and meat of the sheep would come to the rescue, if ever so little. There was also the consideration that sheep running on the land enriched it, and they likewise kept down and destroyed a large percentage of weeds. He preferred Merino sheep, which were easy to manage, fairly hardy, and if not so weighty in carcass as other breeds, their wool was of a better quality. Cows were almost as necessary on a farm as horses, because, in addition to provisioning the table to a large extent, the spare milk could be invested in putting condition on the pigs. Surplus butter could be exchanged for stores which the farm could not produce. It was not advisable to keep more than two or three good cows for the milk and butter supply. He preferred the Jersey or Alderney breed crossed with the Shorthorn. A couple of good breeding pigs of the Berkshire-Tamworth cross were all that was required for supplying pork, and at least 100 fowls should be kept. He was averse to raising horses for market, but to breed for home use was most advisable. He preferred a medium active horse to the pure draught stock, even though an extra horse or two might be required to draw the same load as the heavier horse, because generally the work would be carried through in less time and with less trouble to the team.

## YEELANNA.

June 17th.—Present: eight members.

Blacksmithing on the Farm.—In the mallee land of that district there was a great deal of strain on the implements, owing to the prevalence of stumps and stones, said Mr. J. Carey, in a paper advocating that farmers should be their own blacksmiths, and therefore it was convenient and economical for the farmer to do his own work, instead of running to the tradesman for every minor repair. The forge should not be erected in the open, as blacksmithing was usually a wet day job. He recommended that the blacksmith's shop should be 20ft. x 16ft., and certainly not less than 16ft. x 12ft. An old 200gall. iron tank cut in half made a very good forge. Iron legs should be used, but failing that, four pieces of 3in. x 3in. jarrah would make good uprights. Blowers, though more expensive, were more effective, and occupied less room than bellows. The anvil should be set perfectly level on a solid block. It was necessary to have a drilling machine and a set of stocks and dies. A small stock of bar iron in sizes from ¼in. to ¾in., or even 1in., should be kept for making eyebolts, C hooks, S hooks, and various repairs. A complete shoeing set was also a necessity. He recommended the provision of two benches, and shelving to accommodate the various tools and articles which necessarily found a place in a blacksmith's shop.

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## YABMANA (Average annual rainfall, 15.14in.).

July 15th.—Present: nine members.

Fallow.—By the end of August fallowing should be completed in time to work the land thoroughly free from weeds before harvest, stated Mr. H. W. Schumann in a dissertation on fallow. The land should be ploughed from 3½in. to 5in. in depth according to the class of soil, shallow treatment being given to sandy soil, and a depth of at least 5in. to loamy land. Any ground which had a tendency to drift should be left in a rough state. It should be cultivated to a depth of 3½in., and each subsequent working should be shallower. Fallow could not be worked too often, and it should be worked after every fall of rain. If weeds grew after the spring rains, and the farmer was busy haymaking, a flock of sheep might be turned into the fallow to prevent the weeds from seeding. A cultivator or a skim plough without mouldboards would be found most suitable for working fallow land. Whilst endorsing the principle of early fallow, Mr. W. Doney said that late fallowing was preferable to none at all. Mr. J. F. Robertson pointed out that it entailed much more work to keep land fallowed in June and July free from weeds than if August or September were selected. Land fallowed in the latter months required no working other than harrowing, because the weeds would be killed by the ploughing, though he had grown excellent crops from land fallowed after all the weeds were out in seed. Mr. J. H. Frost would fallow early, before the weeds had seeded, and he would plough to a depth of 5in. In that district land which had been cropped the previous year would produce a crop the second year if the land were ploughed after the stubble had been burned and then reworked before sowing. Land should be fallowed when it contained a sufficiency of moisture, which in some years, was very rare. Mr. A. Schumann advised varying the depth ploughed. If land were ploughed the same depth year after year, a hard, smooth sub-layer would be formed, and the roots of plants would follow along that instead of going down. The fallow should be worked in the spring to the depth that the land had been ploughed, and in the seeding time just deep enough to cut the weeds. Mr. H. P. McCallum said that deep ploughing was satisfactory where the rainfall was good, but in the dry country it had a tendency to cause the crop to blight, and encouraged takeall.

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BUTLER, June 12th.—Mr. G. Parker read a paper on poultry keeping on the farm, and said that farmers should pay more attention to it. The cost of keeping 70 head of poultry had been £5, and the return was £28 6s. 9d. for 546 dozen eggs sold, in addition to the eggs used on the farm. In the course of discussion the opinion was expressed that fowls should be given free range, because the more they foraged for themselves the more healthy they were.

CUMMINS, July 15th.—This was the inaugural meeting of the Branch, and when the officers had been elected and the formal business transacted Mr. J. Sabey read a paper on "Co-operation," which he explained was a working together for the good of all. In a discussion which ensued the principle of co-operation was upheld.

ELBOW HILL, July 15th.—After the annual meeting Mr. A. O. Dawkins read a paper entitled "Dairying on the Farm." Discussion followed, in which it was stated that in that district dairying under existing conditions was more profitable than wheat growing.

GOODE, July 12th.—Discussion took place on the possibilities of live stock. Mr. W. Lavish said that if paddocks left out of crop were sown over for feed, three head of stock could be carried where one was possible at present. Straw and cocky chaff should be stacked for emergency feed. Mr. W. Morcombe said that with abundant water a lucerne patch should be maintained which would keep stock in health. Mr. W. Folland estimated that with abundance of water the large and small stock on the farm could be increased by one-third.

GREEN PATCH, July 10th.—After the annual meeting Mr. C. J. Whillas read a paper on "The Bulk Handling of Wheat," which evoked considerable discussion.

KOONIBBA, July 13th.—A discussion took place on the bulk handling of wheat.

## EASTERN DISTRICT.

### (EAST OF MOUNT LOFTY RANGES.)

### BORRIKA.

June 10th.—Present: 23 members and 11 visitors.

**Advantage of the Complete Harvester.**—Very definite was his conviction of the advantages of the complete harvester over the stripper, set out by Mr. E. H. Huxtable in a paper on that subject. The advantages, he said, were too great to be overlooked at the present time, when labor was so scarce. One man with five horses and a six-foot harvester could deal with 100 acres of oats and 300 acres of wheat. The oats would be finished before the wheat was ready. Compared with the extra cost of handling, etc., entailed by the use of a stripper, the difference in the price of a harvester and a stripper need not be considered. Work with the harvester was also much more pleasant than dealing with the wheat heaps of the stripper. The work could also be done more quickly, thus affording more time to prepare everything for an early start with seeding, which might mean a considerable sum in the succeeding harvest. The waste of wheat upon the sandy floors involved in the use of the stripper was avoided by the harvester. With a stripper it was necessary to make many wheat heaps, which necessitated the shifting of the engine, winnower, etc., whereas the harvester made heaps of 30 bags, which, when sewn up, were ready for market, and if the weather proved unsuitable for harvesting, they could be carted away at once. The harvester worked more easily than a stripper over heavy country, because it was fitted with wider wheels and had a more direct draught, owing to the arrangement for depositing the wheat on the near side. Mr. Penfold agreed with the paper. He had never used more than five horses in the harvester, and for the first 400 bags he had used only four. All his land was new. Hay was a cheaper feed than cocky chaff, because grain had to be added to the latter to provide the necessary nourishment. Mr. V. V. Brown (chairman) said two years ago he had fed his horses on cocky chaff and pollard, at a cost of 7s. per horse per week. Mr. J. B. Tonkin had found the harvester heavy on the horses and had converted it into a stripper, which proved very light in draft, and he worked it with three horses. In reply to a question, Mr. Huxtable said that he saved enough cocky chaff for his requirements with the harvester. Mr. Hart found cocky chaff cheap, but preferred hay, when he could grow it. Mr. Jones said he had saved a number of young horses during the drought by having stored cocky chaff to give them, and they did very well on it.

### CLAYPAN BORE (Average annual rainfall, 16in. to 17in.).

July 10th.—Present: five members and one visitor.

Pig Raising.—The raising of pigs on a large scale was an operation which he had found rather unsatisfactory and very troublesome, remarked Mr. C. L. Dunstan in a paper on the raising of pigs. In the first place, fencing and shelter accommodation were expensive, and the land required to produce abundant feed to provide sufficient to enable pigs to be profitably raised, and it was doubtful whether the profits in 10 years would recoup the fencing outlay. He had tried growing rape, kale, turnips, beet, barley, peas, lucerne, clover and wheat for pigs' food, and wheat and barley alone proved worthy of consideration. There was not sufficient rainfall to depend on anything but cereals. On some of the heavy soils on the flats in wet years it might pay. The pigs should be run on firm ground, because it was possible to make the fences more secure than in sand. A superlatively strong fence was required to retain pigs, and barbed wire even was not effective. Pigs kept on the farm in such numbers as to use up waste products, skim milk, &c., were profitable if kept in a strong sty, but he was adverse to large paddocks, because the country could not be depended upon to produce feed all the year round. Wheat, when cheap, might profitably be fed to pigs, and it would pay to strip barley and feed it either crushed, boiled, or soaked, but the growing of barley had the disadvantage that it was difficult to keep the land clean for wheat afterwards. Oats used in that way would be more satisfactory. Both the Berkshire and the Berkshire crossed with the White Yorkshire proved a very good pork or bacon animal, as required. Some breeders preferrd to cross the Berkshire boar on a Tamworth or Poland China sow, and then breed back again to the Berkshire, the object being to obtain a larger class of bacon pig, with longer sides and more prolific sows, and diminishing as little as possible the qualities of the Berkshire. Summing up, he answered in the negative the question whether it would pay to raise pigs extensively in paddocks, because fencing was too expensive, the animals were too troublesome, the country too new, and the rainfall insufficient. Mr. E. Colvill said that the reason pigs got out of their sty was that they were insufficiently fed. A good sty could be built of five barbed wires and mallee roots. Sows should be turned out into a small paddock until farrowing time. Breeding in hot weather was inadvisable, and the young pigs should be castrated when with the sow. He preferred the White Yorkshire breed. Mr. S. Gray favored the Berkshire breed, using only the best bred boar. Mr. Webb said that the most profitable scheme was to run pigs in small paddocks and feed them at night if necessary. He preferred the Berkshire-Tamworth cross. Mr. G. R. Small said that no wire netting was strong enough to retain pigs, which would break through almost anything unless properly fed. Mr. J. Gray considered running pigs in a paddock the most profitable proposition. The sows and young should be running until six or eight weeks old, and then the young should be housed and fed until fit for the market as porkers, when they were generally most profitable. One year he had been able to sell pork at 3d. per lb., feeding them on wheat at 3s. per bushel. Oats and pollard made an excellent feed. The pig yard should be roofed throughout, or it could not be kept dry. He preferred the Berkshire breed.

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## FORSTER (Average annual rainfall, 10in. to 11in.).

July 22nd.—Present: five members.

How to Make Farming Pay.—In that district, said Mr. W. E. Towill in a paper which dealt with the question how to make farming pay, wheat growing alone was not profitable, owing to the paucity of the rainfall. For five years out of 10 the returns did not pay expenses, and labor could not be profitably employed for that reason. It was necessary, therefore, to look to something else besides wheat growing. More fowls, cattle, and pigs should be kept, especially the latter, owing to the price of pork, which was likely to be maintained for some time. To make a profit which was worth having from fowls about 200 birds should be kept. If the stock of cattle, pigs, and poultry were increased, the farmers should see that there was a good supply of food for them before selling their wheat. The best results were obtained from feeding everything well. He had found that it paid to give fowls as much food as they could eat, with plenty of variety, ample shelter and abundance of clean water. Mr. C. W. Towill recommended fallowing whilst there was plenty of moisture, also scrub rolling for those who had it, and the planting of fruit trees. In reply to a question which was raised members advised cutting almond trees back in the centre to prevent them growing too high. Fig trees did not require pruning; it was only necessary to cut the suckers back. Mr. W. Searle said that care was necessary with poultry keeping on a large scale, as fowls were subject to disease, and needed a large amount of attention.

## LAMEROO (Average annual rainfall, 16.55in.).

July 15th.—Present: 18 members.

Fallowing.—As soon as possible after seeding fallowing should be commenced, urged a member in a paper on "Fallowing," and it should be finished before the end of August, in order to conserve as much of the winter rains as possible. The plough should be set so as to cut all the ground and throw the furrows evenly. The draught should be put on to root up as many stumps as possible. The soil in that district varied in character considerably, and the depth of ploughing should be regulated accordingly, whilst the plough was in motion. Heavy clay soils should be ploughed to a depth of 4in., red loamy soil about 3in., and light sandy soil 2in., the latter being only just skimmed with the plough. He would drill in some oats and about ½cwt. of bonedust to the acre on sandhills about March in the paddocks which were to be fallowed the following winter, thus providing a few extra acres of good feed for the sheep. Sheep assisted in manuring and consolidating the ground, which, with the addition of the bonedust, yielded better results the following year than if fallowed and allowed to drift away. Harrows should not be used to work the fallow because it would be more likely to drift. He preferred cultivating twice over after the ploughing, and cross working it each time where possible. Cultivating should be done before the fallow became too dry, and if rubbish grew after that the sheep could deal with it. The teams should not be put on the fallow again until seeding time, unless very heavy rain fell, when the spring tooth cultivator should be kept going until the fallow was dry. Just before seeding the harrows should be put over the ground once, because that would give the weeds a better start. Cultivation for seeding should be as shallow as possible and wide shares should be used in order to destroy the weeds. Mr. E. J. Trowbridge preferred to use the harrows and then to cultivate. Mr. Campbell said that fallowing deeply on sandy soil would greatly improve it. Fodder growing for green manuring would also improve the land. Mr. A. J. A. Koch said that land should be fallowed 3½in. to 4in., and heavy ploughs should be used to remove as many stumps as possible. Mr. F. W. Eime said that early fallowing was a great success in dry years. It should not be more than 2in. deep, and he would then harrow and cultivate. Mr. G. Hayman said that fodder growing and keeping sheep would pay better than fallowing.

## McNAMARA BORE.

May 7th.—Present: six members and two visitors.

The Mallee Farm.—For clearing the land on a mallee farm, where the mallee was a fair size, Mr. F. G. Williams, in a paper on the mallee farm, recommended the roller. Where the scrub was small the roller was not so good, because it left too many springbacks. In that kind of scrub it was better to make a break around the area required and burn it off. It should then be left for 12 months and ploughed with a share plough. The body of the plough should be taken off next the near side wheel in order to give a good clearance for rubbish, or, better still, a plough should be obtained with the axle 9in. to 12in. longer than usual, because it usually became choked between the last body and the wheel. The object of allowing the sticks to remain standing was that, as the plough went through them they would fall the way the plough was going and slip through, but, if they were down, they would be lying in all directions, and would become tangled and choke the plough. In his experience in that way the number of chokes had only been one in each round of a 30-acre area. After dealing with the land in that fashion the rubbish and stumps should be raked into rows with a scrub rake. The rubbish could then be burned, and the stumps gathered up. If it were at all possible a stone house should be built for the homestead, as it was more comfortable to live in, foodstuffs kept better in it, and the upkeep was less. A vegetable garden should be provided for domestic purposes, and it also produced feed for pigs and poultry. Thousand headed kale should be grown, because it did not require much water in summer or much attention. He had some plants growing which withstood the drought, and as soon as rain came sprouted again. They would grow for three years, and if manured between the rows in winter, and watered in summer would provide good green feed. The best results could not be obtained from mallee land until the roots were ploughed out or killed by fire, because the ground was a network of roots, and the various kinds of weeds tended to check the growth of the wheat. A few years would be occupied in clearing the land, but then if properly manured it would yield good returns. Fallowing was the one thing needed. Sufficient land should be cleared that it might be cropped one year, then bare fallowed, and then fallowed deeply with a good share plough, making one crop in each three years. By that arrangement there would be abundance of land for grazing, which would not only save horse feed, but permit of a few sheep and cattle being kept, thereby converting the weeds into good manure for the land. Mr. H. Sanders said that, in dealing with low mallee it was best to log it both ways, as that left very few springbacks. Mr. J. R. Ling said that when the low mallee had been burned it was best to plough it without rolling or logging.

## MINDARIE.

July 3rd.—Present: 11 members.

Farm Management.—The placing of the homestead was an initial consideration in farm management, said Mr. M. A. Francis, in a dissertation on that subject, and the area should be about 10 acres with all paddocks opening into it, and the buildings should be so placed as to facilitate the handling of machinery and produce. At the outset a complete plan of the finished farm buildings should be designed, and though only a portion might be erected at first, later on, when additions were required, they could be made in pursuance of the original plan, without any necessity to pull down or alter what had been already built. A simple method of bookkeeping should be adopted, containing a record of all transactions on the farm, including the crop returns of each season with a table of the quantity of seed and manure sown, variety of wheat, date of sowing, preparation of land, and any other useful information. Each paddock should be named or numbered, and the data compiled would be not only interesting but instructive. He advocated keeping only the best kinds of horses, cattle, pigs, or fowls, as they ate no more than mongrels, and would always sell well. The breeds he favored were:—Clydesdale horses, Jersey cattle, Berkshire or Yorkshire pigs, and Orpington fowls. Farm work should always be carried out in the best way. It was a mistake to attempt too much, because a smaller area well cultivated would return more than a larger acreage treated in a slipshod fashion. All farm stock should be well looked after and well fed. The machinery should be the best procurable, and after use should be overhauled and repaired before being put away. Too much machinery should not be purchased at once, but time and money should not be lost by working out-of-date implements. A good orchard and vegetable garden should be maintained, and when the land in that district had been cleared a little more sheep should be kept on every farm. They were invaluable on land where wheat was grown and and there were weeds to destroy. The wool always sold well, and then there were the lambs, mutton, and skins as revenue producers. In conclusion he recommended keeping the best of every thing, and keeping a record of everything. Finally it should be remembered that the farm and the life on it were always what the farmer made them. At the previous meeting, on June 5th, Mr. E. L. Parker read a paper on the "Care of Farm Implements," particularly emphasising the necessity for a more extensive use of the spanner to keep all bolts and nuts properly screwed up whilst the machinery was being worked. Proper housing, repairing, cleaning, oiling, and painting of the machinery and implements were also insisted upon.

## NETHERTON.

July 29th.—Present: seven members.

Increased Productivity.—It should be possible, said Mr. F. Byerlee, in a paper dealing with the question whether the South Australian farmer was doing as well as he might, to increase the stock carrying capacity of farms and make more fat stock available for the market. In that district it was necessary to grow oats as a change crop, and instead of selling the oats at the low market rate prevailing to feed them to sheep or cattle. Care in that respect would mean fat stock for sale, when the markets were high, better lambs, and better wool. In that district until the mallee had been killed cattle would be more profitable than sheep, which would be both necessary and profitable when the land had been cleared. Pigs could then be kept in greater numbers than at present. Barley, slightly discolored by rain, which was useless for market could be profitably fed to pigs. He had seen a mouse-proof wheat platform which he thought might be usefully employed for stacking hay. In the structure posts about 2ft. 6in. in height were set in the ground, about 4ft. apart. Each post was sawn off level, and half an empty kerosine tin was placed as a cap on the top of the post, and the platform was built over it. Mice could not get past the cap. It was necessary, of course, to prevent rubbish collecting under the platform. Every farmer should endeavor to increase the productivity of the State, with due regard to the conditions of each district, and then it would be unnecessary to seek outside assistance when the droughts came.

## PARRAKIE (Average annual rainfall, 16in. to 17in.).

July 15th.—Present: 11 members and two visitors.

Care of Harness.—After observing that leather was growing dearer and more scarce, Mr. R. E. Jose, in a paper on "Care of Harness," said that more pains must be taken to preserve harness. New harness should be greased with neatsfoot oil before using, otherwise it cracked and could not be restored. The best way to oil harness was to clean it; the harness and neatsfoot oil should be warmed in the sun, and then the oil should be applied generously with a rag or brush, so that the oil penetrated well into the leather. Needles, thread, and black wax should be always on hand to effect repairs whenever required. Repairs by rivets, though effected more quickly, resulted in the rivets burning the leather if the harness were left standing in the hot sun for any length of time. Mr. W. F. Temby preferred castor oil. Mr. A. J. Beelitz recommended oiling twice a year with the best quality neatsfoot. Members generally agreed that sewing harness was preferable to the use of rivets.

## PINNAROO (Average annual rainfall, 16.74in.).

June 16th.—Present: 24 members.

Discussion.—A number of questions were discussed by the meeting. Mr. L. M. Ferguson recommended allowing horses to run loose at night in preference to tying them up. The condition of the average farm stable was not conducive to comfort or good health, and horses when loose had a better chance to keep warm by moving about. In summer time they could get water whenever they required it. Many horses would not lie down when tied. Mr. F. H. Edwards recommended the separation of bully horses from the others. Mr. Venning said that leaving the winkers on bullies was an effective method of combating the trouble. Mr. R.

McCabe, in giving his reasons for preferring feeding crushed oats rather than whole oats to horses said that the crushed oats were more easily digested, and there was no risk of the paddocks becoming infested with self-sown oats through the horses' droppings. Mr. M. McCabe said that he would feed whole oats to horses when not over hungry, because they would masticate them better. When hungry horses were liable to bolt their food. Mr. H. Ledger, discussing the value of cocky chaff, said that it would not pay to feed it to sheep as a sole diet. Cocky chaff should be saved as a good standby, but oats or other grain should always be mixed with it. The effect of smutty wheat on pigs was referred to by Mr. B. L. Harfield, who said that two pigs of his which had been fed on smutty wheat developed a skin eruption. Smut was a liver stimulant, and in small quantities served as a tonic, but in large quantities set up disorders. A consideration of the class of sheep most suitable to the district induced Mr. W. Venning to prefer the Merino, which, when mated with a Shropshire or Lincoln ram, produced an excellent lamb for the mutton industry. Mr. E. H. Parsons preferred Merinos. Crossbreds were troublesome, unless the fences were very secure. Mr. F. H. Edwards said that the fly pest was less troublesome in such open-wooled sheep as the Leicester or Lincoln. There was some debate as to the three best varieties of wheat for the district, early, mid-season, and late, and the opinion was almost unanimously in favor of Yandilla King, Budd's Early (or Walker's Wonder), and Gluyas. Federation was mentioned as a good mid-season wheat. Mr. R. Edwards preferred the oil engine to the petrol engine on the farm as being less likely to cause fire, but the petrol engine was best for harvesting operations. Mr. F. G. Bonnin preferred long chaff for soundly-mouthed horses, and said that Mr. Place recommended chaff 2in. in length. Mr. Venning favored long chaff, except when feeding time was limited. Mr. Ledger and Mr. R. Edwards thought that 2in. was too long for chaff for general use. Mr. F. H. Edwards said that the difficulty in thinning a self-sown crop of oats with a scarifier in that district was the prevalence of stumps. He suggested cutting off the wings of the cultivator shares and then to closely follow that machine with the harrows. Mr. E. H. Parsons, in answer to a question, said that in feeding wheat which had been pickled with a solution of 1 per cent. to 2 per cent. of bluestone to stock or poultry it should be remembered that bluestone was an irritant poison, which, if given in light doses occasionally would perhaps cause little apparent injury, yet if frequently administered might have serious results.

## ROSY PINE.

July 13th.—Present: 13 members.

Mixed Farming.—Detailing the advantages of mixed farming, Mr. A. Sands, in a paper discussing that subject, said that, to get the best out of a farm it was necessary to have sheep, even if a commencement were made with only a few for the household meat supply, because they were not only valuable in that way, but they returned to the soil a considerable amount of manurial matter. They should be kept in small paddocks and frequently changed about. Each paddock should be sown with a different fodder plant, say one with rape, which would be ready in April and May; another with rye, which would provide pasture in June and July; and a third with cocksfoot, which was a good summer fodder. Pigs, cows, and poultry and fruit and vegetable gardens were essential on a farm, and it would be found that one thing helped to keep the other going. Green waste and surplus vegetables, fruit from the garden, and milk from the cows assisted wonderfully in the maintenance of the piggery and the poultry yard. The best pig for the farm was the Berkshire, the best cattle the Durham, and the best fowls Silver and Partridge Wyandottes and Leghorns. The cropping he advised was wheat, oats, barley, peas, maize, and sorghum; for hay, Tuscan and Bluey wheat and Algerian oats; and for grain, Marshall's No. 3, Yandilla King, and Federation. Maize and sorghum would return a fair profit on the fallow, and also improve the land. It was best to sow peas in July, and, when ripe, they should be harvested on a dull morning. They should be fed to horses, pigs, and cattle as hay. Mr. F. G. Bonnin considered that maize and sorghum did not improve the land. Mr. R. T. Hay's experience with sorghum was disappointing. Mr. C. Lee (chairman) was adverse to sowing fodder on land that was to be cropped the following year. Those who could not afford to make their paddocks sheep-proof could keep pigs profitably. There was always a quantity of wheat, which could not be marketed at top prices, which could be fed to the pigs. Mr. R. E. Schiller said that in addition to keeping sheep a few foals should be bred each year.

## STIRLING'S WELL.

July 15th.—Present: sixteen members.

Care of Implements, Vehicles, and Harness.—Mr. H. J. De Laine read a paper dealing with the care of implements, vehicles, and harness. Before being put away, vehicles and implements should be overhauled and given two coats of paint, the first of oil color and the second containing a little varnish or boiled oil. In treating the wheels of vehicles, instead of merely cutting and shutting the tyres, the boxes should be removed from the naves, in order that the ends of the spokes might come down as far as possible. Each spoke should be wedged at the rim, to secure the proper size, in order that they might have an equal bearing. That operation involved increased outlay, but it made a better wheel. Work of that character should always be done in the hottest weather, when the wood was well shrunk. Mr. Wyatt said that harness should be washed with hot water and soft soap, and then given a coating of vacuum oil and fat black. Before machinery was put away, kerosine should be run through the bearings, which should then be oiled. Mr. W. McGlasson recommended blacklead and kerosine for the bearings of machines before being put away.—At a previous meeting, held on June 20th, Mr. Bowers read a paper on "Haymaking," in the course of which he recommended that hay should not be cut too early, but a start should be made when the grain was in the "dough" stage. It should be cut quickly. Weight was lost by cutting hay too green, and it provided better fodder when the grain was well formed. New hay should be allowed to lie in the field a day or so before being stooked. The stooks should be long and narrow, in order that the wind might pass right through them, and should remain in the field a fortnight before being stacked. If stacked too green hay became heated, and when opened was dark in color, a condition which produced inferior chaff. For hay production, half the area cultivated should be sown with wheat and half with oats. In stacking, the wheat and oats should be arranged in alternate loads, which produced a good mixture when the hay was cut for chaff. In building a stack, the centre should be higher than the sides, and the sheaves on the outside should be placed partly on edge, which enabled the outside of the stack to settle down better than if placed on the flat. The roof of the stack should be built with the butts of the sheaves outward, the first two layers projecting about a foot, and there should be a gradual slope thence upwards, the top being only the width of one sheaf lengthways, which would prevent the rain getting into the stack. It was well to sow early wheats for feed in the mallee country, where it was difficult to cut much hay, because of the dirty nature of the land. Early wheat, with a good rain to start it, grew rapidly. Horses should not be turned into the crop until it was well up from the ground, because of their proneness to pick up sand.

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## WAIKERIE (Average annual rainfall, 8.89in.).

June 16th. Present: 33 members and six visitors.

Underdrainage for Irrigation Orchards and Vineyards.—Without drainage irrigation was a failure, and if the soil were without natural drainage, artificial drainage must be resorted to, remarked Mr. W. E. Muspratt, in a paper on "Underdrainage for Irrigation Orchards and Vineyards." On sandy loams with a big fall it was almost hopeless to try and leach the salts out by flooding (after drainage) although it was the quickest and surest measure, contour grading being out of the question on planted land. So on that class of soil, which was by far the most subject to seepage, the great point was to start drainage before the trouble became at all acute. Not only were the drains and wells much easier to put down, but they would naturally stop a lot of injurious salts ever reaching the surface soil, where they did most damage. The usual methods of disposing of drainage water were wells or dams. He had little faith in the latter, few localities being suitable, and as one had only evaporation to rely on, it would take a very large dam to be effective. A good well was best, and providing one started before the land was waterlogged, that should not be such a very serious problem. Most wells in that district were made 4ft. 4in. x 2ft., with stays down the centre forming a ladder. Care should be taken to timber the well from the start, because water might not only be struck on the way down, but it was almost a certainty that when the drift sand was reached the water would rise perhaps some feet. It was as well to put down a catch pit, say, 6ft. from the well proper and the same size, about 2ft. deeper than the point where the main drain came in. The reason for that was to catch the silt, thus avoiding danger of it getting into, filling up, and spoiling the well. That catch pit required watching and cleaning after the pipes had been first laid and irrigated over, as the soil not being set, naturally the silt was most in evidence. The well should, if practicable, be put down in the lowest spot to be drained; the main drain should be put down on the smallest fall of the land, and the subsidiary drains on a greater slope. The reason for that was that it might be necessary to make a fall for the pipe for the main drain, which added to the cost, and subsidiary drains in all cases would total a much greater length. The subsidiary drains could run into the main at an angle (herringbone) or square. A point was made in favor of the former in most books, but he put his own down on the square. Old-established trees and vines, especially the latter, did not lend themselves to cutting drains through on an angle. Those tee or angle pipes could be obtained with the ordinary ones, but being extra, had to be specified. The distance between subsidiary drains should be about a chain in sandy soil at, say, 5ft. deep, and if in soil of a stiff nature closer and not so deep. He liked to lay his own pipes on the clay, if possible, as there a good hard bottom could be obtained on which to lay the pipes, and also they caught the water as it passed over the clay stratum, which as a rule, but not always, followed the fall of the land. A guide for the depth of drains in badly affected blocks was where the water table was found. They should keep a foot below it. It might be found necessary, after a couple of years, to deepen the drains. To go the full depth for a start one had to try and lay pipes in sludge about as thick as porridge—practically an impossible task to do properly. Most books laid down 4ft. as being deep enough, but personally he liked 6ft., providing the soil was of sufficient depth; but they should not go too far into the clay. The first work was to take levels. In the absence of a dumpy level the following method was useful:—"Measure the line of drains to be put down, then fix a tee piece of wood at the lowest end. On top of this place an ordinary builder's level, arranged with two peep sights, one at either end. See that the level reads at correct level, then place a staff at the upper end of the line with a man in charge. Now take a line through the two peep sights on to the staff, and get the man at that end to mark the exact spot of the sight line. Measure from this spot to the ground, then measure from the line of the two peep sights to the ground; take the upper measurement from the lower, and the difference will be the fall in inches of the ground between level and staff. This can be checked by taking the sights from the higher ground, and placing the staff on a level spot and tying a piece of wire on. Now reduce this in proportion to the same fall in 2ft. 6in. For example, suppose the length from level to staff be 200ft., and the fall 10in.; reduce this in proportion to a 2ft. 6in. line and the fall would be ⅛in. (This is as small a fall as it is safe to work to. The greater the fall the easier it is to lay the pipes. Having found the fall of the land, place setsquares just clear of the trench and at each end, at, say, 5ft. above the intended pipe bed. Intermediate setsquares can now be driven in every chain, using the line of two sets already in as a guide for the rest. This gives a line parallel to the pipe bed, and is a guide to men digging, as by using a measured stick and looking along the sets they may know how deep to go. When trenches are to be over 5ft. deep, place set squares as before, only 6ft. or more, as desired, above pipe bed, and as the men get the trench down measure down the side of the trench from the top of sets (an equal distance in each case) and drive in pegs, leaving a couple of inches or so showing at a handy height for sighting along. Now take two pieces of timber, 2in. x 1½in. and 2ft. 6in. long, see the same are straight and true; tack a piece of leather on the ends, forming a hinge; expand the other ends ⅛in. and make fast by tacking a piece of wood on the side. This makes a set for placing on top of three pipes in the trench. The level placed on top of this should read level. I advise painting the hinge end of the set, say, red, and this should always lie uphill." It was very important that that work should be done properly, as if the pipes were not laid evenly in the trench, and the fall was not gradual, without any undulations, all the work might be thrown away by the silting up of the pipes. They should always start to lay the main drain pipes from the well upwards. If the fall of the land was not enough, they should allow, by starting deep enough at the well, so as not to run too shallow at the top end and still keep a good fall. He advised that the main drain should have a fall of at least 20in. in 200ft., or ¼in. in 2ft. 6in. When laying the main they should put in angle or T pieces at points where the subsidiary drains were wanted to branch off, and half a brick placed on the opening would keep it clean. They should never open up all the trenches first and lay the pipes in when finished. If that were done, considerable trouble would be met with from the falling-in of the sides of the trenches, thus destroying the firm bottom which was essential for the properly laid pipes. In digging the trench the surface and subsoils should be kept on different sides of the trench, so that they might be put back in their proper places. If the trench was not to be more than 4ft. 6in. deep, a top width of 18in. would be enough; if deeper than that the width should be at least 20in. The trenches could be narrowed as they went down, but enough room should be left for the digger to swing his shoulders. He used a small-sized irrigating shovel for making the pipe bed, but a proper drainage tool could be bought for that purpose. Enough bed should be prepared for three pipes, and they should lay the same, fitting the joints as close as possible, and placing over the joints a piece of two-ply building paper. A cut should be made along the width of paper, and it should be rolled into 2in. strips, and divided into five. That would give a piece about 7in. x 2in. That covered the top half of the joints, and prevented soil from silting in before it had time to set. On the top of the paper, which had to be held in place by the pipelayer, a man on top of the trench should be employed to carefully lower shovelsful of earth as the pipelayer directed, the latter packing the same in round the pipes to prevent them shifting; 3in. or 4in. of earth was enough to secure the pipes. The earth taken out from the next spit for the following three pipes should be placed on top of the soil on the last-laid pipes. That saved work. The pipelayer could manage that himself by scraping down soil from the sides of the trench, using the hoe with five or six inches of handle only. That was the cheaper method of the two. That method should be continued throughout, and the water which accumulated in the trench allowed to run through the newly-laid pipes, carrying it off to the well. They should not fill in the trenches as they went, but it was well to put in a foot at a time. The first should be put in each day, covering the length of pipes laid that day. The balance could be put in any time in layers, a foot at a time. He did not quite fill his trenches, and before irrigating ran a fair stream down each trench to settle the soil, after which it could be levelled off. If that was not done and they had to irrigate across the trenches, the furrows would be continually breaking, besides making the next cultivation rather dangerous to the horses. When finishing off each drain, if in a convenient place, it was well to put in a T piece facing upwards. They should place a brick on the dead end and fetch the pipe up to the surface. That served three purposes; it helped to aerate the drains, allowed one to flush out when necessary, and should a clog occur, helped one to locate the particular drain where the trouble existed. Before filling the trench they should cut off all roots protruding, as if left the earth thrown in gave them a slant downwards, and it would not be long before they found their way into the pipes and gave trouble. It was also well to make a plan of the drains for future reference. He did not advise the use of perforated pipes. He preferred 3in. pipes for both main and subsidiary drains. Those cost £5 per 1,000 at Mildura, or £10 per 1,000 on the land (freight and carting cost about £5), enough to do 15 chains of drain. T and angle pieces cost 1s. each. The well timber should be 4ft. 6in. x 6in. x 1in., and 2ft. x 6in. x 1in.; corner battens 3in. x 1in.; galvanized iron nails should be used; side pieces and stays in centre should be 3in. x 2in.; stays should be let in side pieces and be put in 16in. apart to form a ladder. The windlass should have a base rather larger than the well, to rest outside the timber. An oil drum made a good bucket, and a prospector's pick and short square-mouthed shovel would also be needed. Care should be taken in putting down the well, both to go down square and to keep to the exact size, so that the timber fitted in tightly. The latter was important, as if timber slipped it might allow the whole well to silt up. If the land were waterlogged, a "low down" pump should be on hand. It was easier to pump the water out than to have to send the bucket up three or four times full of water against one of soil. The water was usually salt, and therefore it required to be run off where it would do the least damage. A hand bore for testing sinking could be made from 1in. piping cut into two 3ft. 6in. lengths, one each 9ft., 12ft., and 15ft. A handle could be made of two 1ft. lengths screwed into a T joint. On that there should be a 2ft. length of piping. That was handy in making a start. It was well to use 3in. and 1½in. auger bits, the eye in shank cut off, and a reducing socket screwed on, in order to fit the piping. The 3in. auger would be found the best for the first 15ft. or 20ft., after which it became difficult to pull up. Then the 1½in. auger should be put on. It was not only easier to pull up, but having sharper turns did not allow the earth to slip out, which the 3in. one did, especially if water were struck on the way down. That was hard work, and required two fairly strong men. It was not well to tackle that work in windy weather. Six inches would be found any amount to bore at a time, and then it should be lifted and cleaned. He had seen good work done with a patent posthole sinker screwed on to piping to bore down to the drift sand in the well after too much water had been struck to deal with, one hole being put down each side of the ladder. A "low down" pump would not lift any great amount of water after 20ft., and therefore a platform had to be put in the well, using only one-half, the other having to be left free for the bucket. A rung might have to come out of the ladder for working the pump handle. At the close of his address, Mr. Muspratt answered a number of questions.

## WAIKERIE (Average annual rainfall, 8.89in.).

July 21st.—Present: 21 members.

Pear and Apple Pruning.—In the course of an address on pear and apple pruning, Mr. W. Francis recommended pruning to three leaders at the first year's pruning, and doubling the number of leaders every year until four years old, cutting all laterals back to spurs 3in. long, and in summer time cutting back leaders to one-third of the growth made in winter. In summer each year afterwards the laterals should be pruned to spurs. For those who were anxious to get fruit crops early he advised tying the leaders to a hoop or stake in the centre of the tree, after the third year, leaving the trees unpruned, but that should only be done with trees growing strongly. He considered that the end of January was the best time for summer pruning, but on no account should trees be irrigated afterwards because it started the spurs growing again. Cutting to an inside bud was the best means of opening out trees. The top bud should be allowed to grow about 6in., and then the growing point should be nipped out. That would have the effect of starting the buds lower down growing outward in the desired direction. The top shoot should be cut out at the following winter's pruning. Before cutting off the lateral growths, a live bud should be looked for at the intersection of the leaf and shoot, as the Jonathan usually had several blind buds on the first growth of the lateral. Growers should save their small apples when storing for use later in the season, because the large apples, over 2 1-3in. in diameter, were too watery, and would not keep, especially the Jonathan and Cleopatra varieties.

## WILKAWATT (Average annual rainfall, 16in. to 17in.).

July 15th.—Present: 14 members and one visitor.

Colt Breaking.—It is as well to commence handling foals when quite young, advised Mr. J. Ivett, in a paper treating of the handling and breaking in of horses. From the first the animal should be shown that it had been mastered, and there would be no trouble with it afterwards. It should be taught to remain tied up or be led, and by the time it was two or three years old, it would be perfectly quiet and tractable. All that was necessary to break it into harness was to put the mouthing tackle on for a couple of hours for two or three days. Care should be taken, however, not to make the rein fast in the middle. It should run through a ring, so that the colt could move its head either way without taking the strain off either side of his mouth, otherwise there was the chance of the colt being mouthed on one side and not on the other. Then the colt should be harnessed up and placed in the body of a wagon team with a rope around its neck, made fast to the leader's chains, not too tightly, but just sufficiently to keep him in his place. If he would not go into the collar at first he should not be forced with a whip, but be allowed to have his own way, and he would gradually work up to it. Should there be no improvement at the end of two or three days, the neck rope should be tightened, so that there would be a strain on it, and if the colt attempted to hang back he should receive a sharp cut with the whip, but if he should jump into the collar, the whip should not be used. Good leaders were required for breaking in young horses. When driving a team of horses it was always best to whistle or use the same word, so that they would all start together, a much better system than calling to each by name.

**Fallowing.**—A paper on fallowing was read by Mr. E. Altus, in the course of which he recommended that fallowing should be done in July, or not later than the middle of August, the ploughing in the majority of cases being 3½in. deep, though in some places it might be deeper and in others shallower. After ploughing the harrows should be used before rain fell, the stumps picked, and the shoots, if there were any, cut. Then the ground should be harrowed again and sheep turned in until the middle of September, when it should be worked lightly with a skim plough, and harrowed again. The ground was then ready for the drill, provided the seed was to be put in dry, but should it be left until the rain came, it should be cultivated lightly once more. Sheep should be kept on the fallow as long as they could possibly find feed on it, because they not only kept down the weeds, but packed the soil.

## WOODLEIGH.

June 12th.—Present: nine members and two visitors.

Advantages and Methods of Fallowing.—In that district Mr. P. R. Hodge, in a paper on the advantages and methods of fallowing, said the best method of farming in any district could only be determined by experiment. The essentials were that the land should be fallowed in order that the rain which fell might be stored in the soil, and that the fallows be worked to ærate the soil, destroy weeds, prevent loss and waste of moisture by evaporation, and prepare a seed bed. Though it was estimated that early fallow retained in the soil moisture equivalent to two or three inches of rainfall, all the benefits of fallowing were not due to that conservation, because it would be found that the results obtained from fallowed land were greater than from unfallowed, where moisture was plentiful. Ploughing sweetened the soil, and working fallow conserved the moisture. A smaller area well fallowed was better than a great acreage scarified. Working fallow kept the surface soil loose and dry, an earth covering affording protection to the moisture-laden earth beneath. Experiments had shown that about 5in. of rain, during the growing period should admit of 15bush. of grain, or 1½ tons of hay per acre being produced, provided that the ground was in good condition, so far as soil moisture was concerned, when the seed was sown. Land that had been cropped the previous year should be ploughed in the early spring to a depth of 3in. or 4in. All loose stumps should be picked, and the large ones stacked. The harrows should then be used to make a fine surface. About September a tine cultivator or a scarifier should be put over the land, and, if available, a flock of sheep should be turned in. At seed time the ground should be worked before drilling with a disc harrow. The only way to keep weeds down was by frequently and thoroughly working the land.

**BOWHILL**, July 15th.—Arising out of a question by Mr. J. D. Cockshall whether it was preferable to use a plough or cultivator in fallowing drift sand, some discussion took place, in which members generally favored the use of the plough.

**CLANFIELD**, June 17th.—Several papers were read, and there was some discussion on the question how the Government could best assist farmers in the mallee country.

**COONALPYN**, June 16th.—An inspection was made by Mr. Colebatch (the Principal of the Roseworthy College) of several farms. Subsequently Mr. Colebatch addressed the tenth annual meeting of the Branch on the subject of fallowing.

**MANTUNG**, July 13th.—Discussion took place on the question whether shallow or deep ploughing was advisable. Mr. Lehman said that he would plough 3in. deep for seeding. Mr. G. N. Baker considered 3½in. was best for fallowing, and 2½in. for seeding. Light rains benefited a crop more on shallow ploughing than on deep. Fallow should only be cultivated deeply enough to cut the weeds. Mr. W. Stewart advised shallow ploughing while the soil was loose, but when a hard bed formed, it should be broken up. Mr. P. J. Baker recommended ploughing to a depth of 3in. in light soils.

MONARTO SOUTH, June 17th.—A paper on "Shearing" was read by Mr. P. B. Frahn, in which he recommended that sheep should be "crutched" when grass was plentiful, and dirty sheep should be "dagged" before being put on the shearing board. The board should be swept after each sheep had been shorn to prevent trimmings being mixed with good wool. Second cuts should be avoided. By shearing up the neck and down the belly the wool should not be cut. The fleece should be thrown on a table with gratings sufficiently wide to allow all locks to drop through. Damp and stained pieces should be carefully dried before baling.

MORGAN, June 24th.—Mr. G. Hoffman read a paper in which he dealt with the subject of burning scrub, and he remarked that for the burning to be effective the scrub should be thoroughly dry, and to attain that end it should have been felled at least six months previously. The end of February or the early part of March was the best time for the work. It was essential that the burning should be done quickly, before the scrub was affected by moisture, which retarded the burning and reduced the heat, which was necessary to kill the stump. A day should be chosen for burning when a convenient wind was blowing, a light breeze being most suitable.

PARILLA WELL, May 26th.—Mr. J. S. Ferguson read a paper entitled "The Agricultural Bureau and its Work," in which he dealt with the advantages which the farmers had reaped from the activities of the Bureau, more especially the *Journal of Agriculture.*

POMPOOTA, July 20th.—A paper on "Poultry" was read by Mr. B. H. Fidler.

## SOUTH AND HILLS DISTRICT

### HARTLEY (Average annual rainfall, 15in. to 16in.).

August 18th.

HOMESTEAD MEETING.—Members of the Branch, together with a number of visitors, including Messrs. G. R. Laffer, M.P. (member Advisory Board of Agriculture), C. Matthews, P. H. Suter (Dairy Expert), H. J. Apps (Dairy Instructor), H. J. Finnis (Acting Secretary Advisory Board), and representatives of neighboring Branches, foregathered at the homestead of Mr. J. M. Hudd, at Bletchley. During the afternoon a general inspection of the property was made, particular interest being taken in the bore lately put down, and the fine dairy herd. In the evening the visitors were entertained by Mr. and Mrs. Hudd at a banquet, at which Mr. B. Wundersitz presided. At the instance of the Chairman, the loyal toast was honored, after which Mr. Laffer, M.P. submitted "The Empire"; Mr. Beavis, "Our Soldiers," responded to by Lance-Corporal J. T. Hudd; and Mr. C. Matthews, "The Parliament," which was acknowledged by Mr. Laffer. "The Local Branch of the Bureau" was proposed by Mr. Finnis, and responded to by Mr. J. Stanton (Hon. Secretary). The toast of "Kindred Branches" was in the hands of Mr. Hudd, and was acknowledged by Mr. J. R. Rankine (Hon. Secretary Strathalbyn Branch); Mr. C. L. Taylor submitted the toast of the health of Mrs. W. Brook, acknowledged by Mr. C. Brook; Mr. Westwood "The Visitors," Mr. Taylor responding. "The Ladies" was also submitted, to which Mrs. Cleazy replied, and at the instance of the Chairman, the host and hostess were thanked for their hospitality.

### KANMANTOO (Average annual rainfall, 17.90in.).

July 15th.—Present: eight members.

FALLOWING.—Fallowing should be commenced as soon as seeding has been completed, declared Mr. R. G. Critchley in a paper on the subject, because the horses would be in better condition than if turned out for a few weeks and then taken in again. In that district 4in. or 5in. was quite deep enough to plough. After ploughing the land should be harrowed in an opposite direction to the ploughing and then cross harrowed to kill all weeds. In the spare time between shearing and hay cutting the fallow should be treated with a spring-tooth cultivator, and any time occupied in harrowing again would be well spent, because it would conserve moisture. In March the ground should be cultivated lightly, and should be drilled in April (provided sufficient rain had fallen) and then harrowed in the opposite direction to the drill. Fallow treated in that way would amply repay the farmer.

### LONGWOOD (Average annual rainfall, 37in. to 38in.).

June 17th.—Present: 16 members and two visitors.

**The Pig Industry.**—After referring to the fact that every portion of the pig could be marketed, Mr. W. J. Davies, in a paper on "The Pig Industry," advised every farmer to keep pigs. Statistics were quoted showing the progress of the industry in South Australia, and the import and export trade of Great Britain and America. Pig-raising gave little trouble, and the initial outlay was small. A sow usually produced two litters per annum, which should, by proper management, be farrowed in March and September, thus enabling the young pigs to acquire strength before the cold of winter or the heat of summer set in. A useful contrivance in the sty was a strong piece of wood erected around the four sides, about 8in. or 10in. from the ground and projecting about the same distance from the wall. That enabled the young pigs to avoid being overlaid by the sow. Usually, when about to lie down, the sow stood against the wall, got down on her knees, and then slid to the ground, her body being against the wall all the time. If there were any of her young under her and against the wall, she laid on them and they were unable to extricate themselves, but with the arrangement he suggested, they could escape under the rail. Shade and a mud bath should be provided in summer, because the former prevented sun scald, and the latter afforded the animals a means of cleaning themselves. He recommended the Middle York as a bacon producer, and the Berkshire as a good "porker," which matured early. With ordinary care the Middle York should be ready for killing in six or eight months, and should weigh from 160lbs. to 200lbs. They should be fed on raw vegetables and skim milk with a little barley meal or pollard. Pigs fed on skim milk and barley meal, with a few peas each day, made the best bacon. Apple feeding, unless finished off with meal or pollard, produced soft, second class bacon, and too much animal food made the flesh coarse. Pigs, if kept in a clean way, would be clean themselves. If from the beginning young pigs were given dry, warm beds, they would not foul them. The sties should be cleaned out every day, otherwise muck was carried into the bedding on the pigs' feet, and the bedding then becoming cold and wet, the pigs fouled it. In answer to a question Mr. Davies recommended the use of raw food because cooked food tended to impair the digestive organs and was more expensive to handle. Pork cost 5d. per lb. to produce, and the selling price was 9d. In a general discussion, the methods of the wholesale produce merchants were condemned.

### LONGWOOD (Average annual rainfall, 37in. to 38in.).

July 15th.—Present: 12 members and two visitors.

**Rutherglen Bug.**—Treating of the ravages of the Rutherglen bug and some measures of combating it, Mr. J. C. Blakely said that the pest attacked garden crops and orchards. The female laid large numbers of eggs, which were preserved during the winter in rubbish or scrub which afforded shelter, and were hatched out in the spring. In a few days wings developed, and the insects moved about the gardens in swarms. In that district the bug had only one hatching in the year. To eradicate the pest he used a piece of chaffbag, the full length of the bag, and about 14in. in width, and painted it with coal tar. He attached a long string to each corner of one end of the bagging and placed it between two rows of potatoes. The bag should then be dragged along with an attendant walking behind with a stick in either hand to knock the stalks of the plants. As soon as the plant was struck the pest would fall on to the tar trap. When the trap was full it should be burned. It might be necessary to repeat the operation twice or even three times. The trap was effective, because of the habit of the bug, whenever disturbed to fall off the bush and remain on the ground for a few minutes. Sprays had been tried unsuccessfully, because the pest only moved from one part of the garden to another, returning to the sprayed portion later on. The bug was most troublesome in the warmer part of the season, but it soon disappeared when the days became shorter and the nights grew cold. Mr. Nicholls had dealt effectively with the pest by using long, shallow trays partly filled with kerosine and water. The tray was drawn between the rows, followed by an attendant knocking the bushes. As soon as the bug came in contact with the kerosine it was destroyed.

### MOUNT BARKER (Average annual rainfall, 30.93in.).

June 21st.—Present: 41 members.

LUCERNE GROWING.—Lucerne unquestionably took first place among forage crops, observed Mr. B. Stephenson, in an excellent paper on "Lucerne Growing," and it thrived best in a warm climate with abundant rainfall, conditions which would induce a growth providing many heavy cuts in one season. The heaviest yields were obtained on alluvial flats, where the roots could penetrate deeply in searching for moisture, but it could be grown on almost all classes of soil, from sandy loams with clay subsoil to stiff red loams. In fact it would do well in any locality where the summers were hot and the roots could get down to moisture. Shallow soils, resting on slate or other stone foundations were not adapted to lucerne growing. In every holding in that district some small plot could be found in which lucerne could be profitably grown. One essential to complete success was abundant moisture, and, when that was available, the crop made continuous growth in warm weather, and cuts might be obtained in rapid succession. Good drainage was absolutely necessary, because the crop deteriorated when swamped. Lucerne would not thrive on sour soil, and lime was a very beneficial, if not an absolutely essential ingredient. Except where very shallow the soil should be deeply ploughed, but not sufficiently deep to bring the clay subsoil to the surface. If necessary to produce a fine tilth, the land might be cross ploughed and harrowed two or three times, until the surface had been reduced to a fine tilth. A level surface was advisable if the land were to be irrigated, but otherwise it was not essential, so long as all stones, &c., were removed. In manuring, if using the product of the farmyard, a good dressing of well-rotted stable manure—20 or 30 loads per acre—ploughed in to a depth of 5in. or 6in., and worked down finely, would put the ground in excellent condition for seed. If artificial manure were selected—he preferred bonedust—from 3cwt. to 5cwt. per acre would be ample. A paddock in that district, upon which 5cwts. of bonedust had been used when seeding, had been growing lucerne, without irrigation, for 20 years, and was still producing abundant crops. If sown with the drill, the seed should be only scratched in, and if broadcasted, light harrowing was sufficient. If the ground were very loose it would be sufficient to run over it with a light slide, which he preferred to a roller. The quantity of seed to sow varied with the class of soil. Rich flats with moist subsoil would carry a very thick stand, and from 15lbs. to 20lbs. of seed per acre might be used, but in dry country, from 6lbs. to 12lbs. would suffice. Sown with other grasses, for pasture, 4lbs. or 5lbs. sometimes gave good results. It was important to procure good seed. Hunter River seed was considered to be the best, but local seed, having the advantage of being acclimatized, was preferable. The best time for sowing was the middle of October, when the weather was warm enough to drive away the lucerne flea. He deprecated autumn sowing, because, with the first rains, the flea would return and destroy the young plants. When the crop was from 9in. to 12in. high it should be cut with a sharp scythe, and allowed to lie as cut and wither. That would encourage the young plants to stool. The crop should be cut when the flower appeared on half the plant, or perhaps a little more, because it then possessed its best feeding value. Lucerne improved with working, and if harrowed, or in a small plot, raked over, after each cut the succeeding growth would be greatly assisted. The disc drill or cultivator was a splendid implement to work the ground because it did not tear plants but sliced them, and though it might appear to be destructive, good results were soon apparent. When patches of the crop appeared to be dry and withered it was well to cut it, work the ground, and give the crop a fresh start. If the ground were well manured in the beginning an annual top dressing of farmyard manure, super., or lime would be all that was required afterwards. Lucerne lasted much longer if not grazed, and in no case should horses be turned into it, because they injured the crown of the plant. The first year after sowing the crop should be mown, because if grazed the continued nibbling and treading of the animals injured the young plant. When feeding off was resorted to, the more quickly it was done the better in order that an even plant bed might be provided for the next crop.

IRONBANK, July 15th.—A discussion took place as to the best varieties of peach, plum, and nectarine to cultivate, and it was agreed that in that district those which did best were:—Plums—Climax, October Purple, Grand Duke, Giant Prune, Sultan, and Federation; nectarines—Goldmine.

LONGWOOD, August 12th.—The inclement weather rendering a pruning demonstration impracticable, members discussed garden subjects, especially the root borer insect, which it was stated was a common cause of "die back."

MEADOWS SOUTH, July 12th.—In the course of a general discussion Mr. G. Ellis said that in growing peas he had, in one case, used 1cwt. bonedust and 1cwt. Thomas' phosphate per acre, and in other cases he had used only 1cwt. of bonedust. The crop returns were practically identical.

MOUNT COMPASS, June 17th.—Extracts from various journals on "Elephant Grass" and "Liming of Soils" were read and discussed. A statement of the rainfall for the year was tabled.

## SOUTH-EAST DISTRICT

### KYBYBOLITE (Average annual rainfall, 22in.).

April 20th.—Present: six members.

Methods of Cultivation for Wheatgrowing.—After referring to the varying conditions of soil and climate of different localities, of different farms in the same locality, and even of different fields on the same farm which required different treatment, Mr. L. S. Davies, in a paper dealing with the methods of cultivation for wheatgrowing, said that the first operation in cultivation necessary for the growing of a wheat crop was that of ploughing, which should be performed to a depth suitable to the time at which the work was done, and the nature of the soil to be worked. The time for ploughing was important. In South Australia, where wheat was the principal agricultural crop, it followed that, as bare fallow was necessary in almost every rotation to obtain the best results, the wheat would be grown on bare fallow. The time for ploughing for fallow would be regulated by the need for retaining moisture and the area which the farmer had to cultivate. Where it was required to conserve moisture the earlier the fallowing the better in order to provide for the absorption of the winter rains, but where the rainfall was fairly assured late fallowing would yield the best results. The choice of time would be influenced by the time required to complete the operation, because the work should be finished before the ground became too hard to plough. In fallowing, where water conservation was the aim, it was necessary to harrow the soil immediately after ploughing, and to work it as often as was required to preserve a loose surface, which would act as a mulch during the hot summer months, when so much soil moisture was lost by evaporation. When water conservation was not necessary, the fallow might be left in a rough state, the only factor necessitating cultivation before the summer being the elimination of weeds. The reason for leaving the ground in a rough state under those conditions was that where there was plenty of soil moisture there was generally increased need for better æration of the soil, in order to make available the greatest possible quantity of plant food before the crop was sown. In that district it would probably be found by experiment that cultivation would give no advantage before the late spring or early summer, when the land should be worked with a cultivator, before it became dry. The use of the cultivator was not essential in that operation, though it would probably be found necessary in the majority of cases. If the harrows would give the required result, he always preferred them. In the treatment he had outlined he had proceeded on the hypothesis that the land was free from weeds, but, where sorrel and other weeds appeared it would be found necessary to give special cultivation to cope with them. The land should be worked whenever weeds were present, and, as they appeared after the rains, that was the time when the cultivation should be done. It might be urged that weeds would appear before any summer rains had fallen, but, in that case, they must have commenced growing before the surface moisture dried out in the early summer, when, if a cultivation had been made, the growth would have been checked. In all summer cultivation the best results were obtained when the ground was damp, but, for killing weeds, more particularly sorrel, the operation should be deferred until the weather had become bright and hot after the rain. It was quite possible in summer, when occasional rains occurred, as in an average season, to obtain as good results in weed killing by working the land when a suitable quantity of moisture was present in the surface layer as when working dry. He emphasised the possibility of securing as good results from working the land wet, under the conditions he had indicated, as when worked dry. In itself dry working must always be a disadvantage, because it produced an unsuitable physical condition of the soil, causing it to run together. It also exposed the soil bacteria—very valuable agents in making plant foods available—to the hot sun, causing them to be destroyed, and the effect which their activities might have produced was lost, besides increasing, as it was generally believed, the liability of the crop to be attacked by takeall, although there was no definite proof of it. To secure even depth in sowing, the land should be harrowed before the drill was used, and the drill should be worked across the harrowing. To properly cover the seed, the harrow should follow the drill. When the wheat plant had attained a height of 4in. or 5in. harrowing was beneficial. In the preparation of stubble and pasture land best results were obtained from early ploughing. The depth should be regulated by aiming at the production of a firm seed bed before the seed was sown, an essential for good germination in wheat. The soil in that district lent itself to the easy production of a firm seed bed, and it was possible to plough to a greater depth in working stubble or pasture land in the autumn than would give the best results in most other parts of the State. In most soils, if the ground were harrowed immediately after ploughing and reworked with the same implement it would be found that the condition of tilth required would be obtained. Unless the appearance of weeds or the setting of the surface necessitated the use of the cultivator, the harrows would give the best results. Mr. E. C. H. Schinkel preferred one good working with a skim plough to a number of inadequate workings. Mr. Hahn said that working with a plough was not sufficient to destroy a certain class of weeds, such as sorrel. He preferred the spring tooth cultivator to bring the weeds to the surface.

### NARACOORTE (Average annual rainfall, 22.60in.).

June 10th.—Present 21 members.

Training and Care of a Colt.—As a preamble to a paper on "The Training and Care of a Colt," Mr. J. J. Donoghue submitted a number of "Don'ts," enjoining patience, good temper, and kindness in the handling of a young animal. When the colt was yarded he would probably be wild, and run round, and it was well to allow him to do so, for he would tire eventually. Then it was necessary to catch his eye and keep him fixed until a halter had been placed on him. A large bar bit with two bit straps should then be put in the animal's mouth and buckled to the halter, just tightly enough to press on the cords inside the horse's mouth. A backband should then be put on and buckled tightly with a ring on either side, both rings to be the same height. Then with a pair of reins tied evenly back to the rings on the backband just tightly enough to permit him to reef a little, he could be left for three or four hours. After that one rein should be released and the other tightened, which would cause the animal to walk in a circle. After 20 minutes of that work a change should be made to the other side. By that time it should be possible to hold the colt. Leading was next. A colt must be led Like mouthing, it was better done without wasting strength. For that purpose it was necessary to take a rope or cord, about 8yds. in length, and cross it over the loins, allowing the loop to fall low on the britch and bring each end along each shoulder to rein. The operater would then have a rein in his hand, and when ready to move off he should tighten the rope smartly. After repeating that operation once or twice the colt would walk after the person leading him. The colt should then be tied up with a strong rope tightly around his neck, with the loin rope on in the same manner as for leading, only a little shorter than the neck rope, and he should be allowed to remain in that way for a whole day, but should be given plenty of feed. The legs should be well handled and the feet trimmed, if needed, before putting the colt to work. He should be put to work with only a halter on so that he might see everything. A colt should always be worked in single harness, and his mouth allowed to get well before he was taken to the team. He preferred a sledge with a big box fastened to it for the first, with a long rein. The colt should have a well-fitting collar from the commencement. To prevent sore shoulders it was wise to rub as much sulphur as possible into the hair on the shoulders before the collar was put on. That prevented the shoulders sweating, and they did not gall. In about a fortnight the colt, if his mouth were well, might be introduced to the team. If it were put into the team with a sore mouth there was sure to be trouble. Half a day's work was ample until the colt became hardened. He preferred breaking in a colt at 2½ years, just when he was losing his nippers, and was not able to get his food so well, and therefore, if broken in and fed well he would make a bigger horse than if left for another year. Mr. W. Loller said that it was a great mistake to rein a colt hard when first handling him; light reining made a softer mouth, whereas a tight rein produced a hard mouth, and it always remained so. Mr. A. B. Feuerheerdt said that it was essential to know the temper and disposition of the horse one was dealing with. No two colts had the same disposition, and they should be handled according to their disposition. Mr. S. Hart said that it was a mistake to handle a colt too quickly. He should be gradually developed.

## NARACOORTE (Average annual rainfall, 22.60in.).

July 8th.—Present: 34 members.

Annual Meeting.—This Branch, which was established 27 years ago, held its annual meeting on July 8th, and to a record attendance, the Hon. Secretary (Mr. W. H. Smith) presented a comprehensive and illuminating report of the year's proceedings. From this the following extracts are printed:—"To be able to apply the world 'record' in connection with the doings of the Branch during the past 12 months, after having used it in so many instances, when presenting the 1914-15 report, is perhaps expecting a great deal. Yet, however, it is most pleasing to be able to record that with one exception (that of the number of papers read) the session just ended has proved to be the record one since the formation of the Branch 27 years ago. This is a most gratifying fact, and one of which the members might well feel proud. Perhaps the greatest factor tending towards the continued success of the Branch has been that fine spirit of concord which has always prevailed among the members at the meetings, and it has been of such a nature as to make it a pleasure to assemble together. Members have their differences of opinion as regards matters agricultural, and rightly so, too, and varied as the opinions are (as expressed at the meetings at times) nothing that tended to mar the harmony of the gatherings has ever arisen, as the jovial nature, so characteristic of the agriculturists, has always been in evidence, and all recognise the fact that they are assembled together to disseminate knowledge, which may perhaps be the means of not only helping their fellow producers, but also their districts and the State generally. During the past year 12 general meetings have been held, and the attendance of members has been splendidly sustained throughout, the highest number at any one meeting being 30, and the lowest 19, showing an average per meeting for the year of 24. Within three years the total membership, the attendance of members, and the number of papers read, have been trebled. This in itself is sufficient proof of the keen interest being taken by the members in a worthy institution. In perusing the list of those connected with the Branch for the full term it is noticed that whilst some members have established attendance records worthy of being proud of, others again have made their names conspicuous by their desultory attendance, and it is to be hoped that the members of the latter class will shake themselves up a little and realise their responsibilities and endeavor to make amends during the coming term, and to also study the meaning of the word 'reciprocity.' A feature of the past session has been that the splendid array of produce, &c., displayed at a number of the meetings, some of the exhibits reflecting great credit on the members producing them." A detailed statement of the many activities of the Branch during the year was also presented.

**Presentation to Hon. Secretary.**—The Chairman, on behalf of the members of the Branch, presented Mr. Smith with a travelling rug as an expression of appreciation of the work which he had done, and the esteem in which he was held.

## TATIARA (Average annual rainfall, 19in.).

August 5th.—Present: five members.

**Blacksmithing on the Farm.**—Farmers should only attempt the odd blacksmithing jobs they could do, and not try forge work such as difficult welding repairs, which result in a waste of iron, coal, and time, said Mr. T. L. Truman in a paper. Eye bolts could be made by anyone, because it was not necessary to weld the eye, which needed only to be bent round, and would never pull out. S hooks and C hooks could also be made on the farm. When a bolt dropped out of a plough or other implement it was a mistake to wire it up. Another bolt should be put in, and if there was not one in stock a makeshift could be improvised by making a piece of iron hot, screwing it up tightly in the vice, and beating a head on it. That was a much better contrivance than wire. A blacksmith's outfit should not cost more than £15 or £20, and should comprise a blower, anvil, hand and sledge hammers, set of dies, tongs, chisels, punches, and square. If a nut became stiff it was better to split it off with a cold chisel than to risk breaking the bolt. All old bolts and washers should be saved because they would come in handy at some time.

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**All communications to be addressed:**

**"The Editor, Journal of Agriculture, Victoria Square, Adelaide."**

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CLARENCE GOODE,

*Minister of Agriculture.*

# POINTS FOR PRODUCERS.

**Hills Branches Agricultural Bureau Conference.**

The Annual Conference of those Branches of the Agricultural Bureau situated in the Hills district is to be held at Morphett Vale on Thursday, October 12th. Sessions will be held in the morning and afternoon. Proceedings will be opened by the Hon. R. P. Blundell, M.P. (Minister of Industry), addresses delivered by departmental officers, including the Poultry Expert (Mr. D. F. Laurie), and papers read by members of the Branches.

**Imports of Plants, Fruits, Etc.**

During the month of August, 1916, 1,207bush. of fresh fruits, 9,916bush. of bananas, 20,176 bags of potatoes, 641 bags of onions, 52,906 heads of cabbages and cauliflowers, 180pkgs. of other vegetables, and 161pkgs. of plants, trees, &c., were examined and admitted at Adelaide and Port Adelaide under the Vine, Fruit, and Vegetable Protection Acts of 1885 and 1910; 20bush. of bananas (over ripe) were destroyed, and 19pkgs. of tomatoes, &c., were returned owing to the absence of the necessary Phylloxera declaration. Under the Federal Commerce Act, 1,211 cases of fresh fruits, 4,819pkgs. of dried fruits, 300pkgs. of preserved fruits, and 1pkg. of plants were exported to oversea markets. These were consigned as follows:—For London, 7 cases of citrus fruits and 3,904pkgs. of dried fruit; for New Zealand, 1,204 cases citrus fruit, 615pkgs. of dried fruit, and 1pkg. of plants; for Vancouver, 300pkgs. dried fruit; for South Africa, 300 cases preserved fruit. Under the Federal Quarantine Act 2,854pkgs. of plants, seeds, bulbs, &c., were examined and admitted from oversea sources; 70 bags of linseed from Japan were cleaned at the Plant Quarantine Depot on account of the presence of proclaimed weed seeds.

During the month of September, 1916, 899bush. of fresh fruits, 12,460bush. of bananas, 17,536 bags of potatoes, 1,099 bags of onions, 11,220 heads of cabbages, 767pkgs. of other vegetables, and 130pkgs. of plants, seeds and bulbs were examined and admitted at Adelaide and Port Adelaide under the Vine, Fruit, and Vegetable Protection Acts of 1885 and 1910; 156bush. of bananas (over ripe) were destroyed. Under the Federal Commerce Act, 989 cases of fresh fruits, 2,263pkgs. of dried fruits, and 65pkgs. preserved fruits were exported to oversea markets. These were consigned as follows:—For London, 1,203pkgs. dried fruit and 25pkgs. preserved fruit; for New Zealand, 989 cases citrus fruit; South Africa, 460pkgs. dried fruit; India and East, 40pkgs. preserved fruit; Canada, 600pkgs. dried fruit. Under the Federal Quarantine Act 814pkgs. of plants, seeds, and bulbs were examined and admitted from oversea sources.

# INQUIRY DEPARTMENT.

**Any questions relating to methods of agriculture, horticulture, viticulture, dairying, &c., diseases of stock and poultry, insect and fungoid pests, the export of produce, and similar subjects, will be referred to the Government experts, and replies will be published in these pages for the benefit of producers generally. The name and address of the inquirer must accompany each question. Inquiries received from the question-boxes established by Branches of the Agricultural Bureau will be similarly dealt with. All correspondence should be addressed to "The Editor, *The Journal of Agriculture*, Adelaide."**

## VETERINARY INQUIRIES.

[Replies supplied by Mr. F. E. Place, B.V.Sc., M.R.C.V.S., Veterinary Lecturer.]

"H. D. H.," Wirrabara, reports that pigs are affected with worms, and seeks treatment.

Reply—Feed daily equal parts of saltpetre, sulphur, charcoal. See that little pigs get a teaspoonful at each feed and older ones a dessertspoonful. The worms are the long round worm of the pig, *ascaris suis*.

"E. S. B.," Tongowoko, *via* Peake, has a mare over due to foal, hard udder.

Reply—This mare would be better for 10 drops of tr. pulsatilla during the last month of carrying her foal once daily, and under the present conditions the same dose morning, and 10 drops tr. belladonna evening, for a fortnight. The olive oil is good, but hot soapsuds would be cheaper and better as an application to the udder.

"B.," Brentwood, had mares troubled with stoppage after foaling.

Reply—The abdominal pain generally spoken of as stoppage that occurs after foaling is often due to overfulness of the bowels at the time, and generally to the severe muscular straining during birth. A good remedy is half a pint of gin, half a teaspoon of peppermint essence in half a pint of warm water.

"D. & T.," Nor'-West Bend, report that draught horses were turned out on rich irrigated feed. A gelding played with foal, went down as if to roll, groaned, quivered, and died. The other came in at fast trot with mob a few days later and repeated the performance, with the same result. No illness before, and nothing definite post mortem.

Reply—The symptoms are exactly those that come to hand often when feed is lush, and the point to be noted is, rapid action, playing with foal, trotting into stable; this rapidly increases the fermentation of the feed in the stomach, which distends to such an extent that the heart's action is mechanically stopped, thus bringing about the very sudden death. Should there be time for treatment, bleeding at the jugular is best, relieving the congestion, followed by ammonia in some form with peppermint extract.

"O. G. M.," Purnong, has a mare, aged, with hard lump on side caused by chafing of swivel, stiff pus exudes from holes in swelling, mare is stiff in off fore leg.

Reply—The symptoms seem to point to infection of the abscess by some fungus, such as actinomyces. It would be well to make a plaster of Venice turpentine and put on the sore for a few days, then clean off with spirit of iodine and lance boldly, bringing away any dead material in the sore; dress with the same spirit after, and when quite dry repeat the plaster, renewing it every few days, and kindly report progress in a fortnight or so. The stiffness may be from local glands becoming affected.

''W. L., jun.,'' Salt Creek, drove gelding, four years, 20 miles. The animal scoured and knocked up, swelled up and passed sand, lived a few days, with colic intermittently, and died.

Reply—The trouble was not lockjaw, but colic, the setting of the jaws at the end being due to pain which very probably resulted from a ruptured bowel. When a horse is sanded it is well to remove it by drenching with a pint and a half of milk in which a pound of honey has been dissolved.

''F. J. K.,'' Port Wakefield, has a gelding, three years, sluggish at work, gets stiff off side, and falls as if dead. Difficulty in passing water, which is as dark as blood.

Reply—The symptoms point to abscess caused by bloodworms and affecting the liver. Give him a long spell and a tablespoon of Fowler's solution of arsenic in a little bran every day for three weeks, and kindly report progress at the end of the time.

''L. S.,'' Mount Gambier, had ewes grazing three miles from coast for eight months. Lambs swell on one or other leg and lie about, biggest ones generally. Liver and blood dark, gall dark green.

Reply—Why was no examination made of the swelling on the legs, which would probably have revealed local inflammation, for the symptoms are those of ''joint ill'' rather than coast. The sheep should certainly be moved off the affected country, and will probably do better at once, although some more lambs will be affected. The only drug that does good as far as my experience goes is rather expensive; it is acetozone, and any abscesses should be opened and washed out with a 20 per cent. solution, and affected lambs should have a tablespoon of the same solution once or twice a day. The disease is very common in seasons such as the present, and shelter and hand feeding are advisable.

''H.,'' Brentwood, has a pig, three months, lost appetite, skin dried and cracked, and turned red behind shoulders and ears.

Reply—The symptoms point to swine erysipelas. In a similar case open the bowels well with Epsom salts, and dress the skin with any cheap oil, such as fish oil. The disease is often fatal.

''A. D.,'' Keith, has a cow with perforated teat through injury.

Reply—As the fistula has been established it is to be feared that the difficulty will occur again as she comes in, but it would be well to thoroughly cauterise the hole with nitrate of silver and the cover with collodion. If the milk still escapes, the hole could be temporarily stopped with wax or bicycle cement and coated with collodion between milkings.

''M. H. C.,'' Redhill, has a cow which fails to come in season; slight blood streak appears in separator slime.

Reply—The blood is the result of a slight local weakness in the udder, and would probably disappear after a week's treatment of 10 drops of tr. arnica on tongue once a day for a week. She will probably come on heat as the spring advances.

''H. W.,'' Bordertown, has a chestnut gelding, five years, always in poor condition after drought in North.

Reply—There is no doubt his constitution is undermined by the drought, and he will not pick up on hard work, though light regular work will be good for him. Give him two tablespoons of Fowler's solution of arsenic in feed once a day for a fortnight, stop for a fortnight, and repeat for another fortnight, and then report on his condition, quoting 2088.

''A. T.,'' Yadnarie, has pig, five months, in fair condition, but not as good as should have been; long round white worms like those passed by horses.

Reply—The worms are *ascaris suis*, closely related to the similar ones in the horse and man. They do rob the pig of nourishment and cause bellyache and diarrhœa at times. Turpentine (1-2 teaspoons) in milk will clear them, but mind it does not finish the pig as well when drenching, which is best done by cutting off a piece of the toe of an old boot and letting the pig chew on it while the medicine is slowly poured in. A better remedy is to feed cinders or charcoal regularly, and give a teaspoonful of sulphur in the feed once a day for ten days or so.

"W. J. H.," Port Lincoln, has a mare, nine years, in foal. Turned out on sheoak, came in very groggy on legs, groans, eats well, no pain, stands with hind legs tucked forward under her.

Reply—The change of feed has foundered her (laminitis), and possibly upset the foal. Stand her in mud and give 10 drops of tr. aconite three times a day on tongue for a fortnight or so. If not able to stand in mud, use cold swabs on her feet regularly. Report later if not doing as well as she should, quoting 2085.

"W. P.," Naracoorte, has a blood mare, breaking out in hind heels like grease, swelling about hocks and small lumps under skin, tender on feet, which smell badly, not hide bound, and appetite good. Doping suspected.

Reply—The conditions mentioned are the symptoms of blood disorder, and very probably the doping suspected has occurred, and it may seem strange to order a form of arsenic now, but as a certain food advertisement says, "There's a reason." Give her 10 drops tinct. arsenicum morning and evening either in a bit of bran or on her tongue. Dress the hoofs and frogs daily with an ointment made of equal parts mutton fat, resin, Stockholm tar, melted together, and as it is cooling stir in one-tenth part blue mercurial ointment. Apply camphor ointment to the cracks in the heels, camphor one, lard four parts.

"E. G.," Woodleigh, has a foal, 12 days; urine continually passes from navel.

Reply—This condition (pervious urachus) is due to the navel not properly shrivelling, the urine comes through it during life in the womb to form the contents of the water bag, and when it shrivels the urachus becomes the ligament of the bladder. The treatment commonly recommended is to apply a little red blister, failing this a pad of wool and tar or Venice turpentine or a little mustard. The idea is to form a swelling which closes the pipe and stops the trouble.

"L. G. B.," Coomandook, has a cow, poor, losing hair off neck and shoulders.

Reply—Poor animals that are improving in condition often lose hair in this way, and the new coat comes along all right. Sometimes lice are the trouble, in which case dressing occasionally with 1 part benzine and 4 parts any cheap oil will set the matter right.

"K. G. M.," Nantawarra, has mare with bad barbed wire cut.

Reply—From the description it would seem almost useless to attempt treatment, but if it is desired the wound should be supported by bandages and dressed twice a day with spirit of iodine, made by dissolving 1 drachm, *i.e.*, as much as will lie on a shilling, of sublimated iodine in a pint of methylated spirit. If a dry dressing seems desirable a dusting powder of 1 part sulphur to 7 parts boracic acid may be used freely. As little washing or moistening of the wound as possible.

"D. A.," Wirrabara, has a horse with chaff in eye.

Reply—In the early stages the best way of removing the husk is to dip a feather in castor oil or glycerine and work it against the hackles over the eye, but when the husk is fixed it is necessary to inject 20 drops of 5 per cent. solution of cocaine and remove with forceps. Sometimes the husk goes, but leaves an impression as if it were still there, in such cases a little boracic acid blown into the eye once or twice a week assists recovery. In more severe cases it is well to wash the eye with a solution of two grains of nitrate of silver to an ounce of distilled water.

"A. V. C.," Belalie North, has a mare with fistulae of facial sinuses.

Reply—The breaking out and discharge above the nostrils is due to disease of the bone common in your district. Little can be done without an operation, which would not be altogether satisfactory. Dry up the discharge with powdered alum, and put plasters of Venice turpentine on the holes to draw the discharge occasionally.

## HORTICULTURAL INQUIRIES.

[Replies supplied by G. Quinn, Horticultural Instructor.]

"E. B." forwards questions which are replied to as follows:—

1. If 100 Brandis almond trees were planted apart from any other sort it is possible to obtain a crop, but the experience of recent years show a profitable crop cannot be expected from this variety, not even when other sorts are grown with it, and which flower at the same time.

2. The Kaffir apple will make a splendid hedge in clay soils. The olive or carob would be better in limestony soils. These are much slower in growth than the boxthorn. There are other hedge plants such as the *Rhamnus* and the *Tagosaste*, or tree lucerne, but stock will browse on the latter in summer if they can reach it.

For sandy soils the tamarisk is a rapid growing hedge, but it also must be protected against browsing stock. Pepper trees, if planted about 4ft. apart, will make a good hedge in dry country.

3. Olive trees are propagated from truncheons, planted horizontally, at about 4in. to 6in. beneath the soil. These are usually made from wood an inch or more in diameter, cut to, say, a foot or 15in. in length. These trees are also grown from seedlings, which are afterwards budded or grafted with the sorts desired.

4. The pips of orange, apple, or pear should not be allowed to get very dry before sowing. They are usually washed out of the pulp of the fruit, and sown thickly, practically right away in prepared beds, where the ground can be sheltered against extremes of heat or cold, and the young plants watered carefully.

### POULTRY INQUIRY.

[Reply supplied by D. F. Laurie, Poultry Expert.]

"H. D. H.," Wirrabara, asks the cause of fowls dying. They mope about, combs become dark, lose use of their legs; diarrhoea; will not eat; no tick or lice.

Reply—The symptoms point strongly to tick as a cause, and no other. The poultry tick is no stranger in Wirrabara. Search the cracks and crevices of the woodwork, and saturate with kerosine.

## DAIRY AND FARM PRODUCE MARKETS.

A. W. Sandford & Co., Limited, report on October 2nd:—

Butter.—Warmer conditions were experienced for a while in September, followed by magnificent general rains, and the quantity of dairy produce being produced is much more than was the case a month ago, with every indication of keeping up for some time to come. The surplus butter is going to markets mostly in the other States, though one fairly substantial shipment has already been made to England. At the closing of the month prices were:—"Alfa," 1s. 4d.; "Primus," 1s. 3½d.; third grade creamery, 1s. 1d. to 1s. 2d.; choice separators and dairies, 1s. to 1s. 1½d.; store and collectors', 11d. to 1s. per lb.

Eggs.—Very heavy quantities of eggs are coming forward, but with good interstate demand and local picklers continuing to operate, the floors have been kept well cleared. The good weather is in favor of the quality, and prices are higher. Quotations, loose, at mart are:—Hen, 9d.; duck, 10d. per dozen.

Cheese.—In cheese also much larger quantities are available, with values maintaining at late quotations. Fair interstate trade is being put through, and prices are from 7½d. to 8d. per lb. for large to loaf.

Honey.—The first of the new season's take is arriving in small lots, which is finding sale at 4d. to 4½d. per lb. for prime clear extracted. Second grades have slow sale. Beeswax in good request at 1s. 5½d. per lb.

Almonds.—Market is bare, and buyers are already inquiring for the new crop. Prices, nominally:—Brandis, 9½d.; mixed softshells, 8½d.; hardshells, 4d.; kernels, 1s. 5½d. per lb.

Bacon.—Values have improved in sympathy with the advance for the live animal. Local curers are finding it difficult to secure their wants, so that importations have been coming along to fill up the shortage. Best factory cured sides, 1s. 0½d. to 1s. 1½d. per lb.; hams, 1s. 2d. to 1s. 3d. per lb.

Live Poultry.—The forwardings throughout the month have unfortunately been short of trade requirements. Prices have been well maintained, and buyers unable to fill all orders. Good table roosters, 3s. 3d. to 3s. 9d. each; nice conditioned cockerels, 2s. 9d. to 3s. 3d.; plump hens, 2s. 9d. to 3s. 6d.; light birds, 2s. to 2s. 3d.; ducks, 3s. to 4s.; geese, 4s. 6d. to 6s.; pigeons, 10d. to 10½d. each; turkeys, from 8½d. to 10½d. per lb. live weight for fair to prime table birds.

Potatoes and Onions.—As weather conditions have been highly favorable for the rapid growth and early development of new potatoes, holders of old ones have become anxious to sell, with the result that prices have eased considerably. Onions.—Sellers in the South-East and Victoria are exceedingly anxious to quit, consequently the market has further weakened. Quotations:—Potatoes, £6 5s. to £7 5s. per ton on rails, Mile End or Port Adelaide. Onions, £4 10s. to £5 per ton on rails, Mile End or Port Adelaide.

# ROSEWORTHY AGRICULTURAL COLLEGE.

## SIXTH REPORT ON THE PERMANENT FIELD EXPERIMENTS, SEASONS 1904-1915.

[By Walter J. Colebatch, B.Sc., M.R.C.V.S., Principal, Roseworthy Agricultural College, and R. C. Scott, Assistant Experimentalist.]

### INTRODUCTORY.

The fifth report on the Permanent Experimental Field was issued two years ago, and its publication synchronised with the reorganisation of the Agricultural Department and certain consequential changes in the management of the College and its experimental work. In that report, Professor Perkins, to whom is due the credit of successfully inaugurating at Roseworthy College the first permanent field experiments in Australasia, undertook, in conjunction with his collaborator, Mr. W. J. Spafford, to review broadly the whole of the results obtained from the inception of the work up to the end of 1913. They summarised therein the conclusions at which they had arrived after nine years' study of permanent experiments systematically conducted under farm conditions. Their inferences are of much value, and it will be instructive to observe in the future the influence of successive seasons on the mean results that formed the basis of their deductions.

The prior reports have had reference to the plots arranged in the Permanent Experimental Field and Grainger's Superphosphate Plots, but in addition to these, there are a number of other plots of a permanent character that have now been established for a sufficient length of time to warrant inclusion, and consequently we have embodied the results obtained from them in the following pages.

Reports on the Roseworthy College Permanent Field Experiments have been published in the South Australian *Journals of Agriculture* of 1906, 1907, 1909, 1911, and 1914, and have also been issued in pamphlet form for general distribution.

The original plots, which were planned out in 1904, included manurial and rotational tests, most of which have been continued without interruption on the lines originally laid down.

It will be seen, however, on reference to the earlier reports, that a few plots that had already served the purpose for which they were established, have been rearranged, so as to permit of the investigation of other problems for which space could not be found in the original scheme.

## SCOPE OF THE EXPERIMENTS.

In all there are over 250 acres at Roseworthy College devoted to experimental work of a permanent character. Roughly speaking, one-half of the plots are located in Field No. 4, and the other half in what is known as Grainger's Field.

The general arrangement and classification of the plots is here shown.

### GENERAL ARRANGEMENT AND CLASSIFICATION OF PLOTS.

| Nature of Experiment. | Location. | Date. |
|---|---|---|
| A.—*Tillage Experiments.* | | |
| 1. Depth of ploughing | Grainger's B | 1910 |
| 2. Systems of cultivation | Grainger's A | 1911 |
| B.—*Manurial Experiments.* | | |
| 1. Phosphatic fertilisers— | | |
| (*a*) Reversion plots | Grainger's D | 1915 |
| (*b*) Superphosphate | Grainger's C<br>No. 4 | 1910<br>1905 |
| (*c*) Basic slag | No. 4 | 1905 |
| 2. Nitrogenous fertilisers— | | |
| (*a*) Nitrate of soda | No. 4 | 1905 and 1912 |
| (*b*) Sulphate of ammonia | No. 4 | 1911 |
| 3. Potassic fertilisers— | | |
| (*a*) Sulphate of potash | No. 4 | 1911 |
| (*b*) Muriate of potash | No. 4 | 1911 |
| 4. Complete manure— | | |
| (*a*) Farmyard manure | No. 4 | 1906 and 1912 |
| 5. Soil amendment— | | |
| (*a*) Lime | No. 4 | 1912 |
| C.—*Rotational Experiments.* | | |
| 1. Two-course rotation— | | |
| (*a*) Bare fallow<br>Wheat | No. 4 | 1905 |
| (*b*) Sorghum<br>Wheat | No. 4 | 1906 |
| 2. Three-course rotation— | | |
| (*a*) Bare fallow<br>Wheat<br>Pasture (rape) | No. 4<br>Grainger's C | 1905<br>1910 |
| (*b*) Bare fallow<br>Wheat<br>Barley | No. 4 | 1911 |
| 3. Four-course rotation— | | |
| (*a*) Kale<br>Barley<br>Pease<br>Wheat | No. 4 | 1914 |

## GENERAL ARRANGEMENT AND CLASSIFICATION OF PLOTS—*continued.*

| Nature of Experiment. | Location. | Date. |
|---|---|---|
| C.—*Rotational Experiments*—continued. | | |
| 4. Five-course rotation— | | |
| (*a*) Bare fallow | No. 4 | 1911 |
| Wheat | | |
| Pease | | |
| Wheat | | |
| Barley | | |
| (*b*) Bare fallow | No. 4 | 1914 |
| Wheat | | |
| Lucerne | | |
| Lucerne | | |
| Lucerne | | |

## THE EXPERIMENTAL FIELDS.

It will be of assistance to our readers if we outline the history and soil conditions of the fields in which these experiments are being conducted.

### FIELD No. 4.

There are 71 plots of two acres each in this field running north and south. Plots 1-61 inclusive were laid out in 1904, and seven years later a block of 20 acres on the western side was enclosed, giving room for 10 additional plots. The soil ranges in character from a medium to a strong loam,and is probably as uniform in quality as it is possible to obtain land in this district. There is a limestone bank that encroaches on one or two plots to some extent, and crossing the first series of plots is a depression that acts as a drainage course for flood waters in winter. These inequalities, however, are not of practical importance, and could not possibly affect the results to an appreciable extent.

The history of the field antecedent to 1904 is difficult to state precisely, as the boundaries of the present field do not correspond with the original lines of subdivision. The whole of two and portions of at least one other of the original fields are represented in what we now term Field No. 4, and in the ordinary course of farming these contributing fields will have received dissimilar treatment from year to year Nevertheless, it is known that in earlier days the fields, as a general rule, were worked on a bare fallow-wheat rotation, with an occasional year in grass. When under wheat, the crop usually received 2cwts. to 2½cwts. of 37½ per cent. superphosphate per acre. The fallows were sometimes sown with sorghum in the spring, and in moist seasons some fine crops of summer forage were obtained. Complete physical and chemical analyses of this field are wanting, but the State Agricultural Chemist (Mr. J. H. Phillips, B.Sc.), who is responsible for the analytical data quoted in this report, has supplied the following information in respect of the plots receiving ½cwt. dressings of superphosphate:—

*Phosphoric Acid.*—Total, soil, 0.031 per cent.; subsoil, 0.031 per cent. Available, soil, 0.0023 per cent.; subsoil, 0.0015 per cent.

*Carbonate of Lime.*—Soil, 1.23 per cent.; subsoil, 1.86 per cent.

### GRAINGER'S FIELD.

This field, which comprises about 220 acres, was purchased in 1909, and subdivided into four (4) paddocks, which are distinguished by the letters A, B, C, and D.

The soil throughout is fairly uniform in character, and partakes of the nature of a clay loam. It is typical of the bulk of the wheat-growing soils in this district, and up to the time it was acquired by the College had not received artificial manures. It will be of interest to note the mechanical analysis of this type of soil.

TABLE I.—*Indicating Physical Character of Soil, Similar in Type to that in Depth of Ploughing Tests. Depth 0′ 7″.*

| | Per Cent | | Per Cent. |
|---|---|---|---|
| Moisture | 14·54 | Clay | 11·48 |
| Stones, gravel, &c, | 1·63 | Carbonate of lime | 5·49 |
| Coarse sand and fine gravel | 16·76 | Organic matter | 2·97 |
| Fine sand | 31·47 | | |
| Silt | 5·50 | Total | 100·00 |
| Fine silt | 10·16 | | |

The surface soil rests upon a substratum of limestock rock and rubble, which overlies a fat yellow clay. We have not had a complete chemical analysis made of this land, but the soil on the unmanured plot has been tested for phosphoric acid and lime, with the following results:—

*Phosphoric Acid.*—Total, soil, 0.029 per cent.; subsoil, 0.030 per cent. Available, soil, 0.0010 per cent.; subsoil, 0.0014 per cent.

*Carbonate of Lime.*—Soil, 2.04 per cent.; subsoil 6.95 per cent.

The history of the various subdivisions, so far as known up to the time when permanent experiments were initiated, is as follows:—

*Grainger's A.*—A field of 54 acres entirely given up to tillage experiments:—1907, wheat; 1908, stubble; 1909, fallow, 7in.; 1910, wheat, 15½bush.; 1911, divided into plots, half fallowed and half left in stubble.

*Grainger's B.*—A field of 47 acres, 12 of which are utilised for depth of ploughing tests:—1908 fallow; 1909, wheat and oats; 1910, divided into plots, half fallowed and half left in stubble.

*Grainger's C.*—Comprises approximately 100 acres, and includes the "Grainger's Manure Plots" (45 acres):—1907, fallow; 1908, barley and oats; 1909, fallow. The manure plots were fenced off in 1909, and subsequently worked on the three-course system.

*Grainger's D.*—A field of 20 acres originally included in Grainger's C. It was subsequently fenced off in 1909, and treated as under:—1910, wheat; 1911, fallow; 1912, wheat; 1913, rape; 1914, mustard; 1915, reversion plots. The white mustard was a partial failure, and after being fed off the soil was cultivated up and the plots were set out and started on the bare fallow-manured fallow-wheat system.

## SCALE OF VALUES ADOPTED.

It will be convenient if we include in these prefatory observations a schedule of rates adopted in the compilation of the numerous tables which this report must necessarily contain. In many instances the hay yields given have been calculated from total produce yields by means of the definite relationship between total produce and hay, namely, 82 to 100, worked out by our predecessors. The values of sheep and produce have not been modified to fit in with the abnormal conditions of the present-day markets, and this for the reason that in reporting on permanent experiments, comparisons should be made on the basis of average values under normal conditions. The only alteration made is one that affects cost of production, and that only to the extent of 5s. per acre. The following schedule will be useful for reference:—

### SCHEDULE OF VALUES.

| | *s.* | *d.* | |
|---|---|---|---|
| Value of wheat | 3 | 6 | per bushel. |
| Value of barley | 2 | 6 | per bushel. |
| Value of hay | 35 | 0 | per ton. |
| Value of sheep | 15 | 0 | per acre per annum. |
| Value of superphosphate, basic slag | 4 | 6 | per cwt. |
| Value of potassic and nitrogenous manures | 14 | 0 | per cwt. |
| Value of farmyard manure | 5 | 0 | per ton in stack. |
| Value of lime | 1 | 9 | per cwt. |

## WEATHER CONDITIONS.

In entering upon a study of the climatic factors affecting agricultural operations, one of the first features to claim consideration is the rainfall and its distribution. Some of the experiments herein reported on have now been established for 11 years, and it will be noticed that the mean fall for this period is almost the same as that recorded here for the past third of a century.

## TOTAL RAINFALL.

We submit below the rainfall registered each month during the period 1905-1915 comparatively with the means:—

## CLIMATIC CONDITIONS.

TABLE II.—*Showing the Yearly Rainfall, Month by Month,* 1905-15, *comparatively with the Means of* 33 *Years,* 1883-1915.

| | 1905. Inches. | 1906. Inches. | 1907. Inches. | 1908. Inches. | 1909. Inches. | 1910. Inches. | 1911. Inches. |
|---|---|---|---|---|---|---|---|
| January | 2·27 | 0·00 | 0·05 | 0·48 | 0·75 | 1·72 | 0·00 |
| February | 0·13 | 0·08 | 0·33 | 0·45 | 0·28 | 0·00 | 2·13 |
| March | 0·08 | 2·64 | 0·17 | 1·09 | 1·17 | 4·43 | 0·66 |
| April | 2·10 | 0·45 | 2·79 | 0·76 | 1·91 | 0·23 | 0·33 |
| May | 2·24 | 0·99 | 1·96 | 3·36 | 2·89 | 3·20 | 1·79 |
| June | 2·07 | 2·84 | 1·57 | 2·83 | 1·84 | 2·81 | 2·33 |
| July | 2·58 | 1·99 | 1·15 | 1·47 | 3·80 | 2·86 | 1,56 |
| August | 0·87 | 3·36 | 2·25 | 1·79 | 4·56 | 1·32 | 0·68 |
| September | 1·17 | 2·65 | 1·08 | 3·09 | 1·52 | 2·64 | 2·35 |
| October | 2·95 | 1·77 | 1·22 | 2·15 | 2·55 | 2·55 | 0·37 |
| November | 0·25 | 2·26 | 1·94 | 0·07 | 2·08 | 1·18 | 0·04 |
| December | 0·00 | 0·70 | 0·62 | 0·21 | 0·70 | 0·93 | 1·44 |
| Totals | 16·71 | 19·73 | 15·13 | 17·75 | 24·05 | 23·87 | 13·68 |

| | 1912. Inches. | 1913. Inches. | 1914. Inches. | 1915. Inches. | Means. 1905-1915. Inches. | Means. 1883-1915. Inches. |
|---|---|---|---|---|---|---|
| January | 0·09 | 0·11 | 0·27 | 0·81 | 0·60 | 0·81 |
| February | 0·21 | 1·94 | 1·62 | 0·04 | 0·66 | 0·56 |
| March | 0·70 | 1·63 | 0·73 | 0·30 | 1·24 | 0·88 |
| April | 0·91 | 0·31 | 1·38 | 1·95 | 1·19 | 1·69 |
| May | 0·19 | 0·31 | 0·94 | 3·01 | 1·90 | 1·76 |
| June | 1·68 | 0·22 | 0·45 | 4·61 | 2·11 | 2·56 |
| July | 1·87 | 0·69 | 1·32 | 1·89 | 1·93 | 1·85 |
| August | 3·19 | 1·64 | 0·39 | 1·83 | 1·99 | 2·02 |
| September | 2·43 | 2·55 | 0·29 | 3·56 | 2·12 | 1·82 |
| October | 0·94 | 3·89 | 0·08 | 1·27 | 1·79 | 1·64 |
| November | 1·84 | 1·21 | 1·27 | 0·21 | 1·12 | 1·03 |
| December | 0·92 | 1·16 | 0·62 | 0·28 | 0·69 | 0·77 |
| Totals | 14·97 | 15·66 | 9·36 | 19·76 | 17·33 | 17·41 |

It may be noted that in the seasons 1914 and 1915, with which this report is chiefly concerned, the total rain differed considerably from the mean fall. In 1914 it amounted to little more than one half the normal total, whereas in 1915 we registered 2.35in. above it. The influence of such extreme departures from average weather conditions is apt to cause irregularities in the mean results of experiments that have only recently been inaugurated. Those that have been established for 10 years or more will not be seriously affected, and, in any event, even when normal climatic conditions prevail, there would be no justification for placing reliance on figures derived from tests that have only been under observation for two or three years.

Where annual crops are concerned, however, the distribution of rain falling over the growing period is of greater importance than the yearly total, and we proceed, therefore, to an analysis of what is termed the "useful" rain into "seeding," "winter," "spring," and "early summer" rains.

## "USEFUL" RAINFALL.

The following table contains particulars of the distribution of "useful" rain from 1905 to 1915 inclusive:—

TABLE III.—*Showing Distribution of " Useful " Rain*, 1905-15, *comparatively with Mean Distribution of* 33 *Years*, 1883-1915.

| Year. | Seeding Rain (April-May) Inches. | Winter Rain (June-July) Inches. | Spring Rain (Aug.-Oct.) Inches. | Early Summer Rain (Nov.) Inches. | Total " Useful " (April-Nov.) Inches. | Rain without Influence on Cereals. Inches. |
|---|---|---|---|---|---|---|
| 1905 ....... | 4·34 | 4·65 | 4·99 | 0·25 | 14·23 | 2·48 |
| 1906 ....... | 1·44 | 4·83 | 7·78 | 2·26 | 16·31 | 3·42 |
| 1907 ....... | 4·75 | 2·72 | 4·55 | 1·94 | 13·96 | 1·17 |
| 1908 ....... | 4·12 | 4·30 | 7·03 | 0·07 | 15·52 | 2·23 |
| 1909 ....... | 4·80 | 5·64 | 8·63 | 2·08 | 21·15 | 2·96 |
| 1910 ....... | 3·43 | 5·67 | 6·51 | 1·18 | 16·79 | 7·08 |
| 1911 ....... | 2·12 | 3·89 | 3·40 | 0·04 | 9·45 | 4·23 |
| 1912 ....... | 1·10 | 3·55 | 6·56 | 1·84 | 13·05 | 1·92 |
| 1913 ....... | 0·62 | 0·91 | 8·08 | 1·21 | 10·82 | 4·84 |
| 1914 ....... | 2·32 | 1·77 | 0·76 | 1·27 | 6·12 | 3·24 |
| 1915 ....... | 4·96 | 6·50 | 6·66 | 0·21 | 18·33 | 1·43 |
| Means— | | | | | | |
| 1905-15 ..... | 3·09 | 4·04 | 5·90 | 1·12 | 14·16 | 3·18 |
| 1883-1915 ... | 3·45 | 4·41 | 5·49 | 1·03 | 14·38 | 3·03 |

It is evident from these figures that the year 1914, in which the total rainfall was easily the lowest yet recorded, opened favorably, and a good seeding resulted. The April and May rains were somewhat scanty, but yet sufficient to promote healthy germination and first growth. The winter proved exceptionally dry, only 1.77in. being measured, and several severe frosts were experienced.

The dryness of the winter months, however, was wholly eclipsed by the drought that set in at the end of July. Given one or two soaking downpours in August or September, the crops would have yielded fair returns, but with a total spring fall of approximately three-quarters of an inch, spread over a period of three months, the crops barely succeeded in reaching maturity—in fact, in one or two instances, the crops had to be abandoned, and stock were turned in to dispose of such growth as had managed to struggle through.

One result of the drought was to bring about an early harvest, and by the end of November all our crops had been threshed. From this it will be seen that the 1.27in. of November rain were in reality far from being "useful"; on the contrary, this fall merely served to hinder harvesting operations.

The 1915 season was remarkable for the relatively high proportion of the total rain that was "useful." The seeding rains were favorable, there being heavy showers towards the middle of May, followed by substantial falls a month later. This led to excellent seeding conditions, and the crops were sown in ample time on clean and well-worked fallows.

Both the winter and spring rains were above the average, and although several frosts occurred, the crops were not injured by them.

The months of October and November were relatively warm, and this, in conjunction with the heavy spring rainfall, led to weak, sappy growth that favored the *puccinia graminis* fungus, and rendered the crops very susceptible to damage from rough weather. The red rust parasite took full advantage of the lowered resistance of the crops, and many of the plots became so badly affected that the grain was small and pinched.

It is worth noting that the large amount of useful rains recorded in 1915 discounted the value of the fallow rains of the year before.

For comparative purposes, it is useful to observe that the average hay and grain yields on the College Farm for 1914 and 1915 were as follows:—1914—Hay, 14cwts. 75lbs. per acre; wheat, 11bush. 28lbs. per acre. 1915—Hay, 2 tons 7cwts. 23lbs. per acre; wheat, 21bush. 13lbs. per acre.

## "FALLOW" RAINS.

It is generally conceded that the rain falling on a properly treated bare fallow is retained to a considerable extent, and is of more or less benefit to the succeeding crop, according to the amount of useful rain that falls on the crop.

In the following table we have summarised the available data concerning the "fallow" rains since 1904.

TABLE IV.—*Showing "Fallow" Rains—August* 1*st of one Year to March* 31*st of Succeeding Year,* 1905-15—*comparatively with Means of* 33 *Years,* 1883-1915.

| Season. | In. | Season. | In. |
|---|---|---|---|
| 1904/1905 | 7·18 | 1910/1911 | 11·41 |
| 1905/1906 | 7·96 | 1911/1912 | 5·88 |
| 1906/1907 | 11·29 | 1912/1913 | 13·00 |
| 1907/1908 | 9·13 | 1913/1914 | 13·07 |
| 1908/1909 | 9·51 | 1914/1915 | 3·86 |
| 1909/1910 | 17·56 | | |
| Means | | 1904/1915 | 9·98 |
| Means | | 1883/1915 | 9·61 |

These figures serve to show that the fallow rains in 1913-14 were decidedly above the average, whereas in 1914-15 they amounted to only 3.86in., as against a mean fall of 9.61in. It is somewhat remarkable, and possibly misleading to some extent, that the crops sown on well-soaked fallows, but grown under droughty conditions, failed, whereas those raised on the sparsely moistened 1914 fallows, under a "useful" rainfall of 18.33in., gave highly satisfactory returns.

## GENERAL CHARACTERISTICS OF THE PRECEDING NINE SEASONS.

In order to complete the weather comments, and to enable those who peruse the subsequent pages of this report to fully comprehend the significance of the figures recorded, and the reasons for the conclusions drawn, the climatic conditions that characterised the previous nine years—1905 to 1913 inclusive—are here given in brief summary:—

Season 1905-06 was characterised by very favorable seeding weather; by a cold, wet winter, without, however, much frost; by a late, cold spring; and finally by very favorable ripening weather. Both hay and grain yields were exceptionally heavy, and of excellent quality. The general College Farm yield of hay was represented in this season by 3 tons 5cwts. 67lbs. to the acre, and the general wheat yield by 24bush. 11lbs. to the acre.

Season 1906-07 opened with unfavorable seeding weather, followed by a very dry, though mild, winter. The spring months were, on the whole, unusually moist; unfortunately high temperatures accompanied by severe northerly winds set in rather suddenly, and blighted off many of the crops. The hay crops, although bulky in appearance, did not weigh well and were poorer in quality, whilst much of the grain was shrivelled and inferior. The general College Farm hay average was represented by 2 tons 11cwts. 90lbs., and the wheat average, 14bush. 30lbs. to the acre.

Season 1907-08 opened with favorable seeding weather, succeeded, however, by a very cold, dry winter; 18 heavy frosts were recorded this winter. Spring months were both dry and hot, and both hay and grain yields were light, although of good quality. The general hay average on the College Farm was represented by 1 ton 15cwts. 108lbs., and the general wheat average by 13bush. 20lbs. per acre.

Season 1908-09 opened with favorable seeding weather, followed again by a cold, dry winter, amply compensated for, however, by copious September and October rains. Ripening weather, too, was very favorable, and in the end both hay and grain crops were heavy in yield and of excellent quality. The general hay average on the College Farm was represented by 2 tons 7cwts. 5lbs. to the acre, and the wheat average by 22bush. 14lbs. to the acre.

Season 1909-10 again opened with favorable seeding weather, albeit at times somewhat wet for field operations. The winter months were exceptionally wet, and many crops in the district were under water for several weeks, much to their detriment. Spring months were very moist and favorable, and all crops were most promising in appearance until early summer, when some of the most forward were slightly blighted off by hot weather. In the end both hay and grain crops were very heavy and of exceptional quality. The general hay average on the College Farm was 2 tons 15cwts. 68lbs. to the acre, and the wheat average 25bush. 5lbs. to the acre—the highest grain average hitherto recorded on the College Farm.

Season 1910-11 was characterised chiefly by unfavorable seeding weather, followed by exceptionally wet winter and spring months. The ripening period was favorable. Eventually hay crops were very heavy, but grain crops rather light and poor in quality. The general hay average on the College Farm was represented by 2 tons 7cwts. 31lbs. to the acre, and the grain average 17bush. 26lbs.

Season 1911-12 was remarkable for the general shortage of the rainfall; seeding rains, winter rains, spring rains, and early summer rains were one and all below the normal average of the district, moreover seeding rains did not reach us until the middle of May. Finally, November was unduly hot, and hindered the ripening off of the grain crops. Our hay crops were of fair quality, and averaged on the Farm 1 ton 8cwts. 6lbs. to the acre, whilst the Farm wheat crops averaged 14bush. 17lbs. to the acre.

Season 1912-13 was again a season of low rainfall. There were practically no seeding rains; rain sufficient to bring about the germination of sown crops did not come until the last week in June. Winter rains were fair, although still below the normal mean, whilst spring and early summer rains were exceedingly copious and well timed. Towards mid-October, College crops promised to be exceptionally heavy; unfortunately the latter end of the month proved very dry and hot, and the crops experienced a rather severe setback. The average hay yield on the College Farm was 1 ton 14cwts. 90lbs. to the acre, and the average wheat yield 19bush. 36lbs. to the acre.

Season 1913-14. We have to note for this season almost complete absence of both seeding rains and winter rains, with the result that crops that had been sown in April and May did not germinate until the beginning of August. Spring rains, on the other hand, were abnormally heavy. These late germinating crops made rather rank growth in the spring, and ultimately succumbed to red rust and untimely hot north winds. The College Farm hay and wheat yields were the lowest on our records, viz., for hay, 16cwts. 7lbs. to the acre, and for wheat, 6bush. 32lbs. to the acre.

## (A)—TILLAGE EXPERIMENTS.

The magic influence of phosphatic fertilisers on the agricultural development of South Australia has had the effect of dwarfing the importance of soil tillage. It must be patent to all, however, that improved methods of fallowing have contributed very largely to the success of our farming system. Early in the history of the State farmers learnt the need of fallowing, and the first principal of this institution was an insistent advocate of thorough cultivation.

It was not, however, until the apostles of so-called "dry farming" began to voice the claims of a particular form of tillage that experimentalists gave serious attention to the relative merits of different systems of soil culture.

In our view sufficient study has not been given in the past to this phase of farming, and we hope to extend the area devoted to it in the near future. For the present we must confine our attention to two groups of plots, one of which is designed to bring out the effects of ploughing land at different depths, whilst the other is arranged to contrast the effects of six different modes of fallowing.

### (*a*) Depth of Ploughing.

The depth to which the soil should be ploughed in order that the maximum returns may be obtained from it is of fundamental importance. The basis of all sound systems of arable farming is good ploughing, and no matter how skilfully the work be performed ploughing can never be regarded as satisfactory unless the soil has been turned to a proper depth. The ideal depth is one that in an average season will lead to the most profitable crops, and at the same time contribute towards the general improvement of the land. It would appear to be a relatively simple matter to determine experimentally the optimum depth of furrow for any district, but in reality the problem is beset with difficulties. The results obtained from test plots of different depths will always be influenced by a number of varying factors, such as climatic conditions, character of crops grown, time of ploughing in relation to rainfall, and both prior and subsequent treatment of the land. In humid climates where, in the ordinary course of farming operations, land is lifted at different seasons in preparation for crops dissimilar in habits and requirements, and where the bare or dead fallow is only resorted to occasionally in order to clean a foul field, the problem is much more complex than it is under the bare fallow, wheat rotation, which predominates in South Australia. Even under this simple system, however, it is found to be necessary to modify the furrow depths according to circumstances. Thus late fallows are always ploughed shallower than early ones; light sandy and gravelly soils should not be turned as deeply as strong clay loams; many peaty soils do best when ploughed relatively shallow. Nevertheless, in any particular locality it is possible to determine by permanent field plots the most profitable depth at which to plough land under any given circumstances, and the results thus obtained might fairly be assumed to apply to all soils of approximately the same character, situated in districts that experience similar climatic conditions. It is obviously essential, therefore, that in submitting the results of any such experiments the character of the land, the features of the climate, and precise details as to the treatment should be clearly described.

The depth of ploughing plots are located in Grainger's B Field, a full description of which has been given in the prefatory remarks. Descriptive notes on general weather conditions have also appeared in preceding pages, but it was deemed advisable in connection with this experiment to measure the actual amount of rain that descended on the plots instead of applying the results obtained at the central gauge, which is situated about two miles distant.

The records thus obtained are as follows:—

TABLE V.—*Showing Amount of Rain Registered in Rain Gauge located in Grainger's B*, 1911-15.

| | 1911.<br>In. | 1912.<br>In. | 1913.<br>In. | 1914.<br>In. | 1915.<br>In. | Means 1911/1915.<br>In. |
|---|---|---|---|---|---|---|
| January | 0·05 | 0·07 | 0·07 | 0·21 | 0·66 | 0·21 |
| February | 2·47 | 0·11 | 1·39 | 1·98 | 0·02 | 1·19 |
| March | 0·60 | 0·56 | 1·34 | 0·71 | 0·27 | 0·70 |
| April | 0·31 | 0·68 | 0·26 | 0·83 | 1·76 | 0·77 |
| May | 1·79 | 0·13 | 0·25 | 1·02 | 3·04 | 1·25 |
| June | 2·12 | 1·56 | 0·16 | 0·48 | 3·35 | 1·53 |
| July | 1·77 | 1·73 | 0·64 | 1·17 | 1·62 | 1·39 |
| August | 0·63 | 2·94 | 1·48 | 0·30 | 2·35 | 1·54 |
| September | 2·41 | 2·22 | 2·62 | 0·41 | 3·51 | 2·24 |
| October | 0·38 | 1·59 | 3·51 | 0·06 | 1·45 | 1·40 |
| November | 0·00 | 1·25 | 1·34 | 1·42 | 0·21 | 0·84 |
| December | 1·10 | 0·57 | 1·05 | 0·62 | 0·28 | 0·72 |
| Totals | 13·63 | 13·41 | 14·11 | 9·21 | 18·52 | 13·78 |

The mean fall for the period 1911-15 is decidedly low for the district, being 4.63in. less than the normal, that is, below the mean fall for the past 33 years. It is also nearly 1in. less per annum than that registered at the central gauge for the same period. The point to be noted then is that the results now being reported upon have been obtained under abnormally dry conditions. In 1915 the rainfall slightly exceeded the normal, but for the four years immediately preceding the mean fall was approximately 5in. below the average for the district. This means that the whole of the yields recorded below, with the exception of those for 1911, were obtained from crops grown on land that was fallowed up in years of abnormally low rainfall. Copious rains fell in 1910, a fact which must be remembered in connection with the figures for 1911.

### ARRANGEMENT OF PLOTS.

At the time of purchase the field was in a state of bare fallow, and the same year was sown with wheat and oats for a hay crop. The following season 12 one-acre blocks were surveyed off, and every alternate one was bare fallowed. The plots are arranged in pairs so as to suit the two-course—bare fallow, wheat—rotation. The first pair of plots are ploughed to a depth of 2in., and the depth increases by 2in. gradations up to a maximum of 12in. for the last pair.

### TREATMENT OF PLOTS.

The whole of the plots are ploughed up in the winter, the actual date varying according to the season. The earliest ploughing took place in 1911, the work being started on June 30th, and the latest occurred in 1913, when the want of rain caused us to delay operations till the second week in August. A single-furrow plough is employed, and owing to the care required to ensure strict adherence to the conditions imposed the work extends over about eight days.

After the winter the plots are cultivated as deemed advisable in order to maintain a clean surface. The 2-in. plot, of course, can only be worked to the depth of the ploughing, and consequently it is sometimes necessary to give it an additional stirring, but the remainder of the series are cultivated to an average depth of 4in. At seeding time the plots are usually drilled in May after a scarifying and sometimes a harrowing; in this respect all plots receive the same treatment. The seed sown is pickled, graded wheat (85-95lbs. per acre), and the manure is 36-38 superphosphate (2cwts. per acre). A stroke of the harrows concludes the work on the plots till harvest comes round. The crops are cut and threshed and the stubbles are grazed off with sheep.

## YIELDS OF PLOTS.

The yields of grain and total produce for each year of the test, as well as the means for the whole period, are given below:—

TABLE VI.—*Showing Yields from Depth of Ploughing Plots*, 1911-15.

| Depth. | Grain per Acre. | | | | | | | | | | Mean. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1911. | | 1912. | | 1913. | | 1914. | | 1915. | | 1911/1915. | |
| | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. |
| **2in.** | 19 | 31 | 19 | 10 | 11 | 15 | 8 | 28 | 18 | 53 | **15** | **27** |
| **4in.** | 27 | 10 | 21 | 58 | 7 | 31 | 10 | 47 | 14 | 7 | **16** | **19** |
| **6in.** | 25 | 29 | 21 | 39 | 7 | 48 | 10 | 19 | 16 | 37 | **16** | **22** |
| **8in.** | 28 | 23 | 21 | 22 | 8 | 34 | 10 | 21 | 17 | 53 | **17** | **19** |
| **10in.** | 27 | 23 | 21 | 42 | 9 | 11 | 9 | 42 | 18 | 5 | **17** | **13** |
| **12in** | 26 | 33 | 22 | 54 | 8 | 32 | 9 | 6 | 20 | 14 | **17** | **28** |

| Depth. | Total Produce per Acre. | | | | | | | | | | | | Mean. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1911. | | | 1912. | | | 1913. | | 1914. | | 1915. | | 1911/1915 | | |
| | T. | C. | L. | T. | C. | L. | C. | L. | C. | L. | T. | C. | T. | C. | L |
| **2in.** | 1 | 18 | 94 | 1 | 13 | 64 | 19 | 32 | 12 | 106 | 1 | 16 | 98 | **1** | **8** | **34** |
| **4in** | 2 | 3 | 84 | 1 | 16 | 58 | 13 | 94 | 15 | 30 | 1 | 9 | 82 | **1** | **7** | **92** |
| **6in.** | 2 | 3 | 109 | 1 | 13 | 109 | 14 | 32 | 12 | 6 | 1 | 15 | 5 | **1** | **7** | **97** |
| **8in** | 2 | 6 | 78 | 1 | 12 | 56 | 15 | 20 | 13 | 109 | 1 | 17 | 41 | **1** | **9** | **16** |
| **10in** | 2 | 4 | 72 | 1 | 14 | 39 | 16 | 43 | 10 | 60 | 1 | 18 | 74 | **1** | **8** | **102** |
| **12in** | 2 | 6 | 58 | 1 | 13 | 80 | 12 | 86 | 9 | 42 | 1 | 19 | 37 | **1** | **8** | **38** |

The deeper ploughings have, on the average, given slightly higher yields than the lighter furrows in grain as well as in hay. Thus we see that the average grain return from the 4-in. plot is 16bush. 19lbs., whereas the 8-in., 10-in., and 12-in. plots have yielded 17bush., plus 19lbs., 13lbs., and 28lbs. respectively. These differences, however, are smaller than we have anticipated, a matter of only 2bush. separating the extremes. The plots, however, have grouped themselves in a fairly regular series, and it seems clear that the depth of ploughing has a direct effect on the grain yield. Reference to the figures for the years 1914 and 1915 bring out the preponderating influence of rainfall as a factor in wheat growing. Thus we see that, whereas in the dry year the medium depths of ploughing gave the best grain crops, in the wet year that followed the arrangement of plots in order of yield is practically reversed. The behaviour of the 2-in. plots is not always easy to understand. In three seasons out of five it has been the least productive, and in the other two it has been in advance of all the plots. The three years of low yield were certainly dry years, and one of the other two (1915) was a year of good rainfall; in the remaining season (1913) the seeding rains did not fall and the crops failed to germinate till August, which may account for the better growth on the shallow-ploughed land.

With regard to total produce of hay yields, the highest mean yield has been given by the 8-in., and the lowest by the 4-in., ploughing. Here again the plots come very near together, the maximum discrepancy between any two plots being 1cwt. 31lbs., and since this represents a range of only about 4 per cent. no great importance should be attached to the inferences based upon these results.

For what they are worth, however, we give below tables showing the net values of the differences between the mean grain and hay yields:—

TABLE VII.—*Showing Comparative Values of Grain Yields from Depth of Ploughing Plots*, 1911-15.

INCREASE OVER OR DECREASE BELOW.

| Depth. | Mean Yield. | 2in. | | | 4in. | | | 6in. | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Diffce. in Yield. | Value at 3s. 6d. per Bush. | Net Value. | Diffce. in Yield. | Value at 3s. 6d. per Bush. | Net Value. | Diffce. in Yield. | Value at 3s. 6d. per Bush. | Net Value. |
| | B. L. | B. L. | *s. d.* | *s. d.* | B. L. | *s. d.* | *s. d.* | B. L. | *s. d.* | *s. d.* |
| 2in. .... | 15 27 | — | — | — | — | — | — | — | — | — |
| 4in. .... | 16 19 | 0 52 | 3 0 | 3 6 | — | — | — | — | — | — |
| 6in. .... | 16 22 | 0 55 | 3 2 | 2 2 | 0 3 | 0 2 | –1 4 | — | — | — |
| 8in. .... | 17 19 | 1 52 | 6 6 | 3 6 | 1 0 | 3 6 | 0 0 | 0 57 | 3 4 | 1 4 |
| 10in. ... | 17 13 | 1 46 | 6 2 | 0 2 | 0 54 | 3 2 | –3 4 | 0 51 | 3 0 | –2 0 |
| 12in. ... | 17 28 | 2 1 | 7 1 | –2 11 | 1 9 | 4 0 | –6 6 | 1 6 | 3 10 | –5 2 |

### TABLE VII.—*Showing Comparative Values of Grain Yields from Depth of Ploughing Plots,* 1911-15—continued.

INCREASE OVER OR DECREASE BELOW.

| Depth. | Mean Yield. | 8in. | | | 10in. | | |
|---|---|---|---|---|---|---|---|
| | | Diffce. in Yield. | Value at 3s. 6d. per Bush. | Net Value. | Diffce. in Yield. | Value at 3s. 6d. per Bush. | Net Value. |
| | B. L. | B. L. | *s. d.* | *s. d.* | B. L. | *s. d.* | *s. d.* |
| 2in. | 15 27 | — | — | — | — | — | — |
| 4in. | 16 19 | — | — | — | — | — | — |
| 6in. | 16 22 | — | — | — | — | — | — |
| 8in. | 17 19 | — | — | — | — | — | — |
| 10in. | 17 13 | –0 6 | –0 4 | –3 4 | — | — | — |
| 12in. | 17 28 | 0 9 | 0 6 | –6 6 | 0 15 | 0 10 | –3 2 |

### TABLE VIII.—*Showing Comparative Values of Hay Yields from Depths of Ploughing Plots,* 1911-15.

INCREASE OVER OR DECREASE BELOW.

| Depth. | Mean Yield. | 2in. | | | 4in. | | | 6in. | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Diffce. in Yield. | Value at 35s. per Ton. | Net Value. | Diffce. in Yield. | Value at 35s. per Ton. | Net Value. | Diffce. in Yield. | Value at 35s. per Ton. | Net Value. |
| | T. C. L. | C. L. | *s. d.* | *s. d.* | C. L. | *s. d.* | *s. d.* | C. L. | *s. d.* | *s. d.* |
| 2in. ... | 1 14 58 | — | — | — | — | — | — | — | — | — |
| 4in. ... | 1 12 94 | –1 76 | –2 11 | –2 5 | — | — | — | — | — | — |
| 6in. ... | 1 12 100 | –1 70 | –2 10 | –3 10 | 0 6 | 0 1 | –1 5 | — | — | — |
| 8in. ... | 1 15 60 | 1 2 | 1 9 | –1 3 | 2 78 | 4 9 | 1 3 | 2 72 | 4 7 | 2 7 |
| 10in. .. | 1 15 29 | 0 83 | 1 2 | –4 10 | 2 47 | 4 3 | –2 3 | 2 41 | 4 2 | –0 10 |
| 12in. .. | 1 14 63 | 0 5 | 0 1 | –9 11 | 1 81 | 3 2 | –7 6 | 1 75 | 2 11 | –6 1 |

INCREASE OVER OR DECREASE BELOW.

| Depth. | Mean Yield. | 8in. | | | 10in. | | |
|---|---|---|---|---|---|---|---|
| | | Diffce. in Yield. | Value at 35s. per Ton. | Net Value. | Diffce. in Yield. | Value at 35s. per Ton. | Net Value. |
| | T. C. L. | C. L. | *s. d.* | *s. d.* | C. L. | *s. d.* | *s. d.* |
| 2in. | 1 14 58 | — | — | — | — | — | — |
| 4in. | 1 12 94 | — | — | — | — | — | — |
| 6in. | 1 12 100 | — | — | — | — | — | — |
| 8in. | 1 15 60 | — | — | — | — | — | — |
| 10in. | 1 15 29 | –0 31 | –0 6 | –3 6 | — | — | — |
| 12in. | 1 14 63 | –0 109 | –1 8 | –8 8 | –0 78 | –1 3 | –5 3 |

For the purposes of the above tables we have adopted the following arbitrary scale of costs:—Two-inch ploughing, 5s.; 4-in. ploughing, 4s. 6d.; 6-in. ploughing, 6s.; 8-in. ploughing, 8s.; 10-in. ploughing, 11s.; 12-in. ploughing, 15s.

The draught on the plough for 2-in. ploughing is, of course, lighter than for 4-in.; but owing to the shallow depth it is necessary to cut very narrow furrows in order to be able to turn the land over properly. Hence more time is required to plough an acre of land 2in. than 4in. The subsequent working is practically the same for all the plots, and has, therefore, been omitted from the above calculations. The net value figures indicate that the 4-in. and 8-in. plots are equally profitable for grain production. In respect to hay growing the net figures show the 2-in. ploughing to have yielded 1s. 3d. per acre better than the 8-in., and 2s. 5d. ahead of the 4-in.

It must be admitted that these results are as yet inconclusive, and more interest will surround them when the period which they extend over has a mean rainfall that approaches closely to the normal annual precipitation for the district.

### (*b*) Systems of Cultivation.

In 1911 a field of 54 acres, known as Grainger's A, was mapped out into 12 plots, four acres in extent, in order to accommodate six pairs of plots on which to put to the practical test four systems of winter and two of spring fallowing. The field adjoins the ploughing depth plots, and therefore the notes on weather given in respect of them will apply equally well to the experimental area now under consideration. It may be well to add, however, that in three out of four seasons the spring rains were heavy relatively to the winter rains, and thus tended to favor the plots fallowed late.

The general plan of the experiments, together with the details of the operations carried out during 1914-15, are given hereunder:—

## SCHEME OF CULTIVATION EXPERIMENTS.

### Plan of Experiment.

#### *Early Fallows.*

1. Ploughed 7in. deep and immediately rolled with heavy roller. Cross cultivated before September 1, and harrowed immediately after. Cultivated and harrowed subsequently as often as surface crust or weeds rendered necessary.
2. Ploughed 7in. deep and immediately harrowed, cultivated before September 1, and subsequently as often as found necessary.
3. Ploughed 7in. deep and cultivated three times in course of season. Harrowed at seeding.
4. Ploughed 7in. deep, cross-skim ploughed before September 1, and subsequently cultivated as often as necessary.

### *Late Fallows.*

5. Ploughed 7in. deep after September 1; heavily rolled same day as ploughed. Cultivated not later than three weeks after rolling, and if possible after rain. Rolled if necessary. Cultivated or harrowed or both according to condition of tilth.

6. Ploughed 4in. deep after September 1, cultivated after fall of rain and subsequently as often as necessary.

## OPERATIONS CARRIED OUT IN 1913-14.

### *Early Fallows.*

1. Ploughed 7in. deep July 22; rolled July 24; cultivated August 18, October 1-3, November 4-5, January 28, March 2, April 22; harrowed August 19, November 18, February 3, April 29.

2. Ploughed 7in. deep, July 24; harrowed July 25, November 18, February 3, April 29; cultivated August 18, October 1-3, November 4-5, January 28, March 2, April 22.

3. Ploughed 7in. deep July 26-29; cultivated October 1-3, November 4-5, January 29, March 3, April 24-27.

4. Ploughed 7in. deep July 26-29; cross-skim ploughed August 19; cultivated October 1-3, November 4-5, January 29, March 3, April 24-27; harrowed November 18, February 3, April 30.

### *Late Fallows.*

5. Ploughed 7in. deep and rolled same day, September 29-30; cultivated October 1-3, November 4-5, January 29, March 3, April 24-27; harrowed November 18, February 3, and April 30.

6. Ploughed 4in. deep, September 27; cultivated October 1-3, November 4-5, January 28, March 2, April 22; harrowed November 18, May 4.

## OPERATIONS CARRIED OUT IN 1914-15.

### *Early Fallows.*

1. Ploughed 7in. deep, July 13 and 14; rolled July 16; cross cultivated August 17; harrowed August 17; cultivated October 9, November 18, December 21, January 29, April 20; harrowed April 21.

2. Ploughed 7in. deep July 14-15; harrowed July 16-18; cultivated August 17, October 9, November 18, December 21, January 30, April 20; harrowed April 21.

3. Ploughed 7in. deep July 16; cultivated October 9-10, December 22, April 21; harrowed April 22.

4. Ploughed 7in. deep July 15-20; cross-skim ploughed August 18; cultivated October 12, November 19, December 21, February 2, April 22; harrowed April 23.

### *Late Fallows.*

5. Ploughed 7in. deep and rolled same day, September 22-25; cultivated October 12 (not after rain, 8 points during preceding month); rolled November 2-3; cultivated November 13, November 19, December 21, February 2, April 22; harrowed April 23.

6. Ploughed 4in. deep September 26-29; cultivated November 19 (after 31 points of rain); cultivated December 22, February 2, April 22; harrowed April 23.

The general practice is to sow these plots in good time with an early reliable wheat at the rate of 1½bush. per acre with 2cwts. of superphosphate. The early fallows generally start away before the others, the harrowed and skim ploughed plots being particularly quick to braird. Owing to special circumstances the crop has had to be cut for hay in two out of the four seasons under review, and hence we are only able to contrast the plots on the basis of hay yields.

The following table sets out out the annual and mean hay yields from 1912-15 inclusive:—

TABLE IX.—*Containing Hay Yields of Cultivation Plots in Graginer's A*, 1912-15.

| Plot. | Annual Hay Yields. 1912. | 1913. | 1914. | 1915. | Mean Hay Yields. 1912/1915. |
|---|---|---|---|---|---|
| | T. C. L. | T. C. L. | C. L. | T. C. L. | T. C. L. |
| 1 | 2 3 90 | 1 0 55 | 18 75 | 1 18 109 | 1 10 54 |
| 2 | 2 5 66 | 0 18 29 | 16 71 | 1 18 22 | 1 9 75 |
| 3 | 2 1 37 | 0 16 95 | 17 40 | 2 2 23 | 1 9 49 |
| 4 | 2 5 62 | 0 17 25 | 17 51 | 2 4 106 | 1 11 33 |
| Mean yield of early fallows | | | | | 1 10 25 |
| 5 | 2 7 86 | 0 14 80 | 19 94 | 2 6 109 | 1 12 36 |
| 6 | 1 12 75 | 0 11 70 | 12 98 | 2 2 29 | 1 4 96 |
| Mean yield of late fallows | | | | | 1 8 66 |

Before entering upon a discussion of this statement of yields it will be advantageous to ascertain the expenditure incurred for tillage under each system and then to work out the net values of the increments or deficiencies in yield so that comparisons may be instituted on a proper basis. We have ascertained by consulting the records that the tillage operations have cost on the average for the past four seasons from 14s. 2d. on the 4-in. late fallow to 22s. 10d. per acre on plot 1.

The corresponding expenditure on plots 2, 3, 4, and 5 have been 20s. 4d., 15s. 3d., 20s. 7d., and 21s. 11d. respectively.

In computing these charges we have adopted the following rates:—

| | |
|---|---|
| Ploughing, 7in. | 7s. per acre |
| Ploughing, 4in. | 4s. 6d. per acre |
| Skim-ploughing, 2½in. to 3in. | 2s. 6d. per acre |
| Rolling (heavy) | 2s. per acre |
| Cultivating | 2s. per acre |
| Harrowing | 9d. per acre |

TABLE X.—*Showing Comparative Values of Difference in Hay Yields from Cultivation Plots*, 1912-15.

INCREASE OVER OR DECREASE BELOW.

| Plot. | Mean Hay Yield, 1912–15. | Value at 35s. per Ton. | Plot 1. Diffce. in Yield. | Plot 1. Value at 35s. per Ton. | Plot 1. Net Diffce. in Value. | Plot 2. Diffce. in Yield. | Plot 2. Value at 35s. per Ton. | Plot 2. Net Diffce. in Value. | Plot 3. Diffce. in Yield. | Plot 3. Value at 35s. per Ton. | Plot 3. Net Diffce. in Value. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | T. C. L. | £ s. d. | C. L. | s. d. | s. d. | C. L. | s. d. | s. d. | C. L. | s. d. | s. d. |
| 1 | 1 10 54 | 2 13 4 | — | — | — | — | — | — | — | — | — |
| 2 | 1 9 75 | 2 11 11 | -0 91 | -1 5 | 1 1 | — | — | — | — | — | — |
| 3 | 1 9 49 | 2 11 6 | -1 5 | -1 10 | 5 9 | -0 26 | -0 5 | 4 8 | — | — | — |
| 4 | 1 11 33 | 2 14 9 | 0 91 | 1 5 | 3 8 | 1 70 | 2 10 | 2 7 | 1 96 | 3 3 | -2 1 |
| 5 | 1 12 36 | 2 16 7 | 1 94 | 3 3 | 4 2 | 2 73 | 4 8 | 3 1 | 2 99 | 5 1 | -1 7 |
| 6 | 1 4 96 | 2 3 6 | -5 70 | -9 10 | -1 2 | -4 91 | -8 5 | -2 3 | -4 65 | -8 0 | -6 11 |

TABLE X.—*Showing Comparative Values of Difference in Hay Yields from Cultivation Plots*, 1912-15—continued.

INCREASE OVER OR DECREASE BELOW.

| Plot. | Mean Hay Yield, 1912–15. | Value at 35s. per Ton. | Plot 4. |  |  | Plot 5. |  |  |
|---|---|---|---|---|---|---|---|---|
|  |  |  | Diffce. in Yield. | Value at 35s. per Ton. | Net Diffce. in Value. | Diffce. in Yield. | Value at 35s. per Ton. | Net Diffce. in Value. |
|  | T. C. L. | £ s. d. | C. L. | s. d. | s. d. | C. L. | s. d. | s. d. |
| 1 ................. | 1 10 54 | 2 13 4 | — | — | — | — | — | — |
| 2 ................. | 1 9 75 | 2 11 11 | — | — | — | — | — | — |
| 3 ................. | 1 9 49 | 2 11 6 | — | — | — | — | — | — |
| 4 ................. | 1 11 33 | 2 14 9 | — | — | — | — | — | — |
| 5 ................. | 1 12 36 | 2 16 7 | 1 3 | 1 10 | 0 6 | — | — | — |
| 6 ................. | 1 4 96 | 2 3 6 | -6 49 | -11 3 | -4 10 | -7 52 | -13 1 | -5 4 |

Viewing the results broadly, the first point that arrests attention is the very slight difference between the mean figures for the early and late ploughed fallows. Accepting 35s. per ton as an average price for hay in this district, the gross money value of the extra yield on the early fallows—1cwt. 71lbs.—works out at a shade under 3s. per acre. If we exclude for the moment Plot 6, which is ploughed only 4in. deep, and compare the mean yield from the early fallows with the late fallowed plot that is given a 7-in. furrow, we find that the returns from the September ploughing are 2cwts. 11lbs. per acre better than those from the winter-fallowed plots. The difference in this instance, on the same basis of computation, is worth approximately 3s. 8d. per acre. This result is contrary to all expectations, and is admittedly difficult to understand in view of the universal experience in favor of early fallowing. An examination of the results of each year does not simplify matters, for it will be observed that in three out of the four seasons Plot No. 5 has given the highest yield in the whole field. It is true that in 1913, which was a very backward season, the seeding rains being delayed till August, the early ploughing showed to advantage; but in 1914, the driest season on record, and again in 1915, on land that lay fallow during 1914, we find the September ploughed plot at the top of the list. Moreover, in 1915, we notice that even the late fallow that is ploughed 4in. deep gives a higher yield than three out of the four early fallowed plots, despite the 1914 drought. The scarcity of rain during the summer of 1914 no doubt nullified to a large extent the water-conserving effect of good fallow, and thus tended to reduce them all to one level in regard to moisture content; but even so, it comes a surprise to find the returns from the late ploughings in excess of those derived from Plots 1 to 4. The influence of a phenomenal thunderstorm (1.82in.) in February, 1914, on the fallows was very marked. The late fallows harvested this season were then stubble plots, and of course shared in the downpour; but when we remember that the February flood was followed by practically 13 months of drought, it is hardly conceivable that this circumstance would appreciably affect the 1915 harvest. Probably the rough, knobby condition of the late fallows helped them through the wet winter of this season, and checked the formation of hard crust, whereas the thoroughly worked early fallows, being finer in the tilth, tended to melt down and set hard in the dry spring. The most that can be stated in explanation, however, is that the experiments are too short-lived at present to furnish reliable data. This implies that it is considered probable that at the end of 10 or 15 years the present relative position of the plots will be changed, and that the anomalous results so far obtained will give place to others that accord more harmoniously with the generally accepted views on the question of early versus late fallowing.

If we pause for a moment to examine the relative yields and their gross values, we will discover that the deeply ploughed late fallow has exceeded all others; the skim-ploughed early fallow is a good second, a narrow margin of 115lbs. per acre separating the two plots. The remainder of the early fallows have yielded within 4s. or 5s. of the gross return of the top plot; but the late ploughed 4-in. fallow is inferior to the extent of more than twice that amount.

Now, let us compare the results on an economic footing. It is quite clear from the above table of comparative values that when the costs of tillage are debited against the plots, the order of merit is considerably modified. We find that the third plot, which is typical of the general practice on the College Farm, displaces the late 7-in. fallow. No. 3 receives the least cultivation of all, being ploughed and subsequently cultivated three or four times, as needed; yet the net value of the produce is worth about 1s. 7d. per acre more than that of any other class of fallow under trial. The late ploughed 7-in. fallow comes second, thus beating three out of four of the early fallows. It should be mentioned, however, that the all-round charge of 7s. per acre for 7-in. ploughing has been applied to this plot, as well as to the early fallowings. In some years this might be quite a fair and reasonable thing to do; but, on the other hand, in dry years the 7-in. spring ploughing would certainly be more expensive than winter ploughing at an equal depth, and the difference in cost would probably be greater on the average than the extra net value over and above that obtained from Plot 4. The shallow fallow is still the least profitable, notwithstanding the fact that only 14s. 2d. is deducted for expenses. The rolled (No. 1) and harrowed (No. 2) Plots are intermediate in position between Plots 6 and 4.

In summary, we would say that the net results gained so far tend towards the view that the deeply ploughed winter fallow, adequately cultivated to keep weeds down and check loss by evaporation, is the most remunerative of the systems tested. The late ploughed deep fallow is clearly preferable to the 4-in. ploughing in September, and also to all the early fallows except the one that receives ordinary working during the summer. From the manner in which the comparative figures have been tabulated, it is a very simple matter for anyone to see at a glance the relative merits of the different systems in terms of yield, gross values, and net values.

(*To be continued.*)

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# AGRICULTURAL EXPERIMENTS.—REPORT FOR YEAR 1915-1916.

[By W. J. Spafford, Superintendent of Experimental Work.]

## EXPERIMENTS WITH POTATOES.

Conducted by Messrs. Pope Bros., of Mount Barker.

For the last five consecutive years Messrs. Pope Bros., of Mount Barker, have been conducting experiments dealing with the manuring of potatoes, in conjunction with the Department of Agriculture As was pointed out in the last report on these plots (*Journal of Agriculture*, September, 1915) the manuring followed in 1911 was not continued, so the results obtained in that year cannot be used with the results for the last four years, during which time the fertilising has been identical for each year. The treatment of the soil is quite similar for all plots, and the same variety of potatoes is used. The following table shows clearly what the manuring of these plots has been :—

Table I.—*Showing Manuring of Potato Plots at Mount Barker*, 1912-1915.

| Plot. | Fertilisers per Acre. |
|---|---|
| 1 | No manure. |
| 2 | 15 tons farmyard manure, 2cwts. superphosphate. |
| 2A | 15 tons farmyard manure. |
| 3 | 4cwts. superphosphate, 2cwts. dried blood. |
| 4 | 4cwts. superphosphate, 2cwts. dried blood, 1cwt. sulphate of potash. |
| 5 | 8cwts. superphosphate. |
| 6 | 8cwts. basic slag. |

The plots on which these manures have been applied are all one acre in area, with the exception of Nos. 2 and 2A, which are each half acre. In all years only a variety of known suitability to the district has been grown on the plots.

Every year Messrs. Pope Bros. supply a report on the plots, and the reports for the previous years were shown in the last report on these experiments already referred to. For this year they say—" The plots had little chance of giving good yields, as very little rain fell between the times of planting and digging; in fact, plots 7 and 8 (seed tests) being the last planted did not have enough moisture to germinate the setts, and so they were a failure. We are certain much better results would have been obtained had we received more rain after planting, or even more rains in the spring preceding planting. All plots were planted in the third week of December, 1915, and dug by the last week of May, 1916."

In the table below will be found the yields of potatoes obtained from these variously manured plots for the last four years, together with the average yields for that period:—

TABLE II.—*Showing Yields of Potatoes with Various Manures for the Years 1912-1915.*

| Plot— | 1. | 2. | 2A. | 3. |
|---|---|---|---|---|
| Manuring per Acre. | No Manure. | 15 Tons Farmyard Manure, 2cwts. Superphosphate. | 15 Tons Farmyard Manure. | 4cwts. Superphosphate, 2cwts.. Dried Blood |
| | T. C. Q. | T. C. Q. | T. C. Q. | T. C. Q. |
| 1912-13..... | 7 1 2 | 12 17 0 | 12 2 0 | 9 3 2 |
| 1913-14..... | 0 17 3 | 1 12 2 | 1 12 2 | 1 17 2 |
| 1914-15..... | 1 8 0 | 3 7 2 | 2 17 2 | 2 18 3 |
| 1915-16..... | 2 0 0 | 2 0 0 | 1 8 3 | 3 2 2 |
| Means for 4 years .. | 2 16 3 | 4 19 1 | 4 10 1 | 4 5 2 |

| Plot— | 4, | 5. | 6. |
|---|---|---|---|
| Manuring per Acre. | 4cwts. Superphosphate, 2cwts. Dried Blood. 1cwt. Sulphate of Potash. | 8 cwts. Superphosphate. | 8 cwts. Basic Slag. |
| | T. C. Q. | T. C. Q. | T. C. Q. |
| 1912-13..... | 9 2 0 | 9 4 0 | 7 10 0 |
| 1913-14..... | 2 0 0 | 1 17 2 | 1 1 3 |
| 1914-15..... | 2 18 1 | 3 2 3 | 2 16 1 |
| 1915-16..... | 3 7 2 | 3 12 0 | 2 15 0 |
| Means for 4 years .. | 4 7 0 | 4 9 0 | 3 10 3 |

The next table will show the increase in the yields for the various plots over and above the results of the plot planted without manure.

TABLE III.—*Showing Average Increased Yield of Manured Plots over Unmanured Plot for the Period* 1912-1915.

| Plot. | Fertilisers per Acre. | Average Increased Yield, 1912-1915. |
|---|---|---|
| | | T. C. Q. |
| 1 ........... | No manure ................................ | — |
| 2 ........... | 15 tons farmyard manure, 2cwts. superphosphate .. | 2 2 2 |
| 2A .......... | 15 tons farmyard manure ...................... | 1 13 2 |
| 3 ........... | 4cwts. superphosphate, 2cwts. dried blood ........ | 1 8 3 |
| 4 ........... | 4cwts. superphosphate, 2cwts. dried blood, 1cwt. sulphate of potash | 1 10 1 |
| 5 ........... | 8cwts. superphosphate ......................... | 1 12 1 |
| 6 ........... | 8cwts. basic slag ............................. | 0 14 0 |

## SEED TESTS.

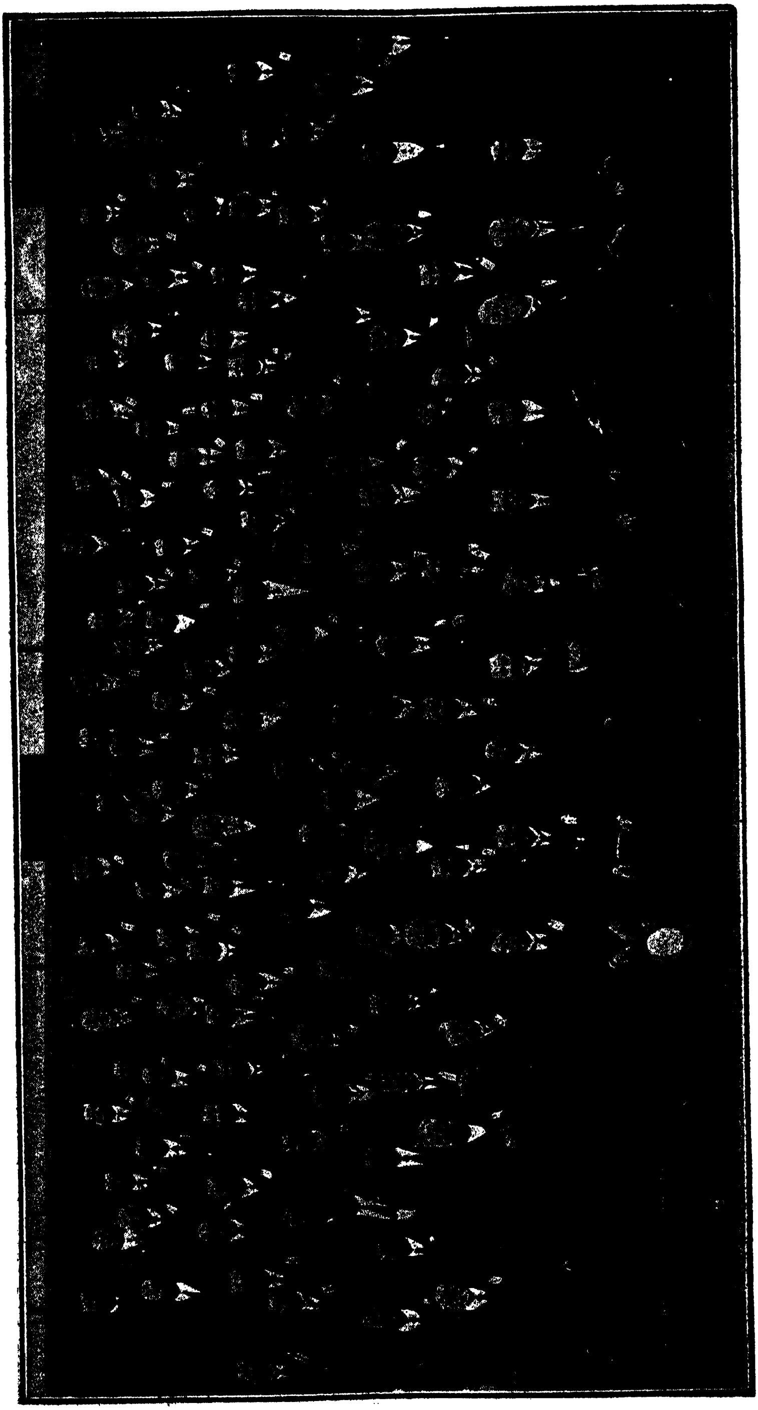
Besides these manurial tests with potatoes there have also been conducted a series of experiments dealing with various treatments of the seed—(*a*) comparing boxed seed with unboxed seed; and (*b*) comparing large uncut seed with small seed. The plots testing boxed seed were discontinued on the advice of Messrs. Pope Bros., as being a very expensive treatment not likely to be undertaken, unless the increased yield obtained as a result of the extra work was very great; that this increase did by no means compensate for the expense of boxes and the extra work that boxing entailed is easily seen by a glance at the results obtained for the period 1912-1914, and shown in last year's report. Small seed was again tested against large seed, and the yields for the last four years are to be found in the table below.

TABLE IV.—*Showing Results Obtained from using Small and Large Seed Potatoes*, 1912-1915.

| Plot. | Seed. | 1912-1913. | 1913-1914. | 1914-1915. | 1915-1916. | Means for 4 Years. |
|---|---|---|---|---|---|---|
| | | T. C. Q. | T. C. Q. | T. C. Q. | T. C. Q. | T. C. Q. |
| 7 .... | Small.. | 4 3 0 | 0 17 3 | 2 18 3 | Failure | 2 0 0 |
| 8 .... | Large.. | 4 15 0 | 1 1 1 | 2 9 3 | Failure | 2 1 2 |

The failure of these plots in 1915-1916 was due, as has already been shown, to a very bad germination through the lack of moisture.

For the years 1912-1914 the plots were dressed with 5cwts. basic slag, 2cwts. dried blood, and 1cwt. sulphate of potash to the acre, but in the season 1915-1916 no sulphate of potash was used, although the other fertilisers remained the same.



Some of the Delegates, and Officers of the Department of Agriculture, who attended the 27th Annual Congress of the Agricultural Bureau, September, 1916.

*W. S. Smith, Photo.*

# THE AGRICULTURAL BUREAU.

## THE TWENTY-SEVENTH ANNUAL CONGRESS.

### OPENED BY THE GOVERNOR.

The Twenty-seventh Annual Congress of the Agricultural Bureau was opened in Osborne Hall, Gouger Street, Adelaide, on Monday, Tuesday, and Wednesday, September 4th, 5th, and 6th.

### DELEGATES.

During the sittings the following delegates attended:—Messrs. J. P. Richardson (Angaston), E. S. Matthews (Angaston), T. O'Donohue (Amyton), T. Griffin (Amyton), John Welch (Arthurton), T. H. Howlett (Arthurton), Wm. Mugford (Beaufort), Bruce Sampson (Beaufort), W. Cummings (Belalie North), A. H. Warner (Belalie North), E. G. Mitton (Berri), F. R. Arndt (Berri), E. C. Deland (Blyth), F. Wiltshire (Blyth), R. F. Mayford (Bookpurnong East), V. V. Crase (Bookpurnong East), Wm. Michael (Booleroo Centre), G. Ashby (Booleroo Centre), H. S. Green (Borrika), J. B. Tonkin (Borrika), J. J. Houner (Brentwood), W. Alderman (Brentwood), J. Travers (Bundaleer Springs), J. Lawrie (Bundaleer Springs), L. E. Simon (Bute), R. Barr, jun. (Butler), A. J. Hughes (Butler), A. F. Dempsey (Canowie Belt), G. A. Noll (Canowie Belt), W. T. Brown (Carrieton), C. T. Fisher (Carrieton), F. J. Annear (Carrow), A. Habib (Carrow), C. Ricks (Cherry Gardens), S. W. Chapman (Cherry Gardens), A. H. Wilkins (Clanfield), W. A. Moar (Clanfield), M. L. Nolan (Clare), R. E. Hunter (Clare), P. H. Knappstein (Clare), A. Phelps (Clarendon), L. Spencer (Clarendon), John Gray (Claypan Bore), Samuel Hill (Claypan Bore), E. H. Whitehead (Colton), Robert Hill (Colton), R. Upton, sen. (Coomandook), W. Ninnis (Coomandook), N. Lillecrapp (Coomooroo), W. Robertson (Coomooroo), J. J. Cronin (Coonalpyn), F. J. Tregenza (Coonalpyn), H. H. Lindo (Cradock), W. J. Venning (Crystal Brook), H. T. Noske (Cygnet River), J. E. Lecky (Davenport), A. O. Dawkins (Elbow Hill), F. H. G. Pfitzner (Frances), S. Meehan (Frances), E. Morris (Freeling), J. A. Mattiske, sen. (Freeling), A. J. Bray (Gawler River), A. W. Roediger (Gawler River), S. Eyre (Georgetown), M. J. McAuley (Georgetown), L. Prouse (Geranium), D. L. Lithgow (Geranium), J. H. Sargeant (Gladstone), W. Odgers (Gladstone), J. T. Halliday (Glencoe), G. F. Ferguson (Glencoe), E. S. Stephenson (Goode), Monfries (Gumeracha), Nosworthy (Gumeracha), C. Russell (Halidon), L. Rosser (Halidon), B. Wundersitz (Hartley), D. Clark (Hartley), J. J. Henschke (Hookina), G. Henschke (Hookina), H. T. Martin (Inman Valley), H. J. Jagger (Inman Valley), Wm. Coats (Iron Bank), Wm. Slater (Iron Bank), D. S. Heaslip (Julia), W. H. Neal (Julia), Robert Correll (Kadina), Robert Truscott (Kadina), H. G. Pym (Kanmantoo), R. W. Rolland (Kanmantoo), T. Cooley (Ki Ki), L. Angus (Ki Ki), Fred Foord (Kingston-on-Murray), J. Wetherall (Kingston-on-Murray), E. O. Dahl (Koonibba), J. S. Foggo (Koonibba), V. W. Gardner (Koppio), G. B. Gardner (Koppio), G. H. Hahn (Kybybolite), A. R. Scholz (Kybybolite), E. J. Trowbridge (Lameroo), G. S. Hayman (Lameroo), P. A. H. Thiele (Loxton), W. H. Mengersen (Loxton), E. G. Blesing (Laura), P. T. Bowker (Laura), W. H. Lloyd (Leighton), R. J. C. Flower (Leighton), J. McInnes (Lucindale), W. M. Secker (Lucindale), J. S. Hammat (Lyndoch), H. C. Williams (MacGillivray), E. G. Jarrett (Maitland), A. V. Nairn (Mallala), H. Catt (Mallala), A. G. Burton (Mangalo), E. Hannaford (Mantung), L. Pearce (Mantung), J. Philpot (Meadows), C. W. Ness (Milang), W. E. Richards (Milang), J. B. Mitchell (Millicent), L. Aunger (Miltalie), P. J. McEachen (Miltalie), O. P. L. Payne (Mindarie), J. S. Johnston (Mindarie), E. Correll (Minlaton), A. P. Braendler (Monarto South), C. F. Altmann (Monarto South), A. B. Ferguson (Moonta), W. J. Brinkworth (Moonta), W. Toop (Morchard), Geo. Collins (Morchard), R. Wohling (Morgan), C. A. R. Wohling (Morgan), A. C. Pocock (Morphett Vale), A. F. Furnniss (Morphett Vale), B. Stephenson (Mount Barker), F. Simper (Mount Barker), A. A. Jeffries (Mount Bryan), C. W. Gare (Mount Bryan East), Jas. Doyle (Mount Bryan East), R. P. Pritchard (Mount Gambier), H. T. Myers (Mount Hope), John Colbert (Mount Hope), John McIntosh (Mount Remarkable), Wm. Smith, jun. (Mount Remarkable), J. Fletcher (Murray Bridge), R. S. Bell (Murray Bridge), Herbert Hill (Mypolonga), A. G. Collis (Mypolonga), C. Sampson (Myponga), M. McGuinness (Myponga), G. C. Gurr (Myrla), F. G. Williams (McNamara Bore), H. Saunders (McNamara Bore), F. J. Sutton (Nantawarra), W. Smith (Nantawarra), S. H. Schinckel (Naracoorte), W. H. Smith (Naracoorte), S. Bottrill (Narrung), H. Bowyer (Narrung), J. Bald (Netherton), C. M. Wilkin (Netherton), W. H. Richards (North Booborowie), A. V. Simpson (North Booborowie), E. W. Kelley (Northfield), W. J. Dall (Northfield), M. J. Neylan (Orroroo), J. McNaughton (Orroroo), M. Shannon (Parilla), A. Inkster (Parilla Well), J. Ferguson (Parilla Well), F. W. Gravestock (Parrakie), T. R. Brinkworth (Paskeville), Chas. S. Lee (Paskeville), P. H. Kilsby (Penola), H. Ricketts (Penola), R. D. Goodridge

(Pine Forest), I. Edwards (Pine Forest), P. J. Edwards (Pinnaroo), P. H. Jones (Pinnaroo), W. R. Whittaker (Port Broughton), J. J. Vanstone (Port Broughton), W. Squires (Port Elliot), H. B. Welch (Port Elliot), A. P. Blesing (Port Germein), J. K. Deer (Port Germein), John Eagle (Port Pirie), A. M. Lawrie (Port Pirie), R. Thompson (Quorn), Jas. Brewster (Quorn), F. G. Rogers (Ramco), H. Green (Ramco), H. Waters (Renmark), H. D. Howis (Renmark), Robert H. Cooper (Riverton), Ern. A. Gray (Riverton), L. E. Cowley (Roberts and Verran), F. H. Wolf (Rosenthal), H. F. Mugge (Rosenthal), M. A. McCabe (Rosy Pine), W. Townsend (Rosy Pine), W. J. McNicol (Salisbury), F. C. Fleet (Salisbury), G. E. Barber (Salt Creek), R. H. Hornhardt (Salt Creek), A. Grant (Sandalwood), W. Willoughby (Sandalwood), T. Partridge (Sherlock), A. G. Kubank (Stirling's Well), J. Murray (Stockport), G. Nairn (Stockport), T. D. Finney (Srathalbyn), W. H. Cumming (Strathalbyn), A. A. Fisher (Tatiara), Thos. Stanton (Tatiara), J. Donaldson (Tintinara), T. Stead (Tintinara), H. W. Kenner (Two Wells), G. M. Gordon (Two Wells), E. Jaeschke, sen. (Waikerie), J. C. Rowe (Waikerie), G. Growden (Warcowie), F. N. Hamp (Watervale), P. Burns, jun. (Wepowie), S. McMahon (Wepowie), G. F. Jenkins (Whyte-Yarcowie), F. N. Lock (Whyte-Yarcowie), W. J. Tylor (Wilkawatt), A. B. Neville (Wilkawatt), S. G. McCallum (Willowie), W. P. Foulis (Willowie), F. Zimmermann (Wilmington), A. J. G. Benier (Wilmington), E. B. Pitman (Wirrabara), E. J. Stephens (Wirrabara), H. H. Exton (Wirrega), W. R. Fairweather (Wirrega), C. E. H. Stone (Wollowa), J. T. Simper (Wollowa), L. Good (Woodleigh), E. T. Smith (Woodleigh), A. S. Hughes (Woodside), W. Rollbusch (Woodside), A. Hood (Wynarka), W. H. Richardson (Wynarka), J. S. Colbert (Yabmana), S. H. Pearce (Yadnarie), H. S. Bauer (Yadnarie), G. E. Opitz (Yaninee), J. Lund (Yaninee), H. Glover (Yeelanna), W. D. Wemyss (Yeelanna), A. Jamieson (Yongala Vale), T. H. Battersly (Yongala Vale), E. F. J. Altschwager (Tantanoola), D. Beaton (Tantanoola), David Kelly (Mintaro), E. A. Scarfe (Mintaro), H. Harrison (Yacka), E. Jenkins (Yacka), Wm. Henning (Pompoota), Wm. Harrison (Pompoota), S. Trigg (Cummins), I. Sabey (Cummins).

## THE OPENING SESSION.

Congress was opened at 8 p.m. on Monday, September 4th, by His Excellency the Governor (Sir Henry Galway). Mr. F. Coleman (Chairman of the Advisory Board) presided, and there were also present on the platform the Minister of Agriculture (Hon. C. Goode), Mr. G. R. Laffer, M.P., Professor Perkins (Director of Agriculture), Professor Osborn, Messrs. W. J. Colebatch (Principal of Roseworthy

College), G. Jeffrey (member of Advisory Board), Henshaw Jackson (Wool Instructor of the School of Mines), D. F. Laurie (Poultry Expert), W. J. Spafford (Superintendent of Experimental Work), S. McIntosh (Director of Irrigation), C. J. Tuckwell (member of Advisory Board), A. M. Dawkins (member of Advisory Board), G. G. Nicholls (Secretary of Wheat Board), P. H. Suter (Dairy Expert), H. E. Laffer (State Viticulturist), W. L. Summers (Secretary of the Minister of Agriculture), T. H. Williams (Chief Stock Inspector), J. Miller (member of Advisory Board), and H. J. Finnis (Acting Secretary Advisory Board).

The Chairman welcomed His Excellency on behalf of the Advisory Board, and asked him to declare the Conference open.

## THE GOVERNOR'S ADDRESS.

His Excellency said: Two years ago I had the pleasure of presiding at the annual meeting of the Agricultural Bureau. When that meeting took place we had been a month at war, and we all lived in hopes that the struggle would not be a long one. However, here we meet in the third year of the greatest war in history, and nobody can even now attempt to predict when the end will come. I do not propose to dwell for long this evening on the one topic which has held possession of our thoughts for the last two years. I would say, however, that the prospects of the Allies were never brighter than they are to-day. We have every reason to feel confident that the fortunes of Germany are very much on the down grade, and that, in God's good time, the champions of everything that is ignoble, dishonorable, and barbarous will be crushed, and the promoters of this hideous war arraigned before the tribunal of those nations who count freedom, honour, liberty, and justice as the *vade mecum* of good government. No man possessing high ideals can have any pity for a nation which has allowed itself, like a herd of cattle, to be driven blindly by the Prussian military clique which governs Germany, and of which clique the Kaiser is the paramount leader. The Kaiser stands accused and condemned in the eyes of the civilised world. He has inspired his commanders to follow blindly in his wake of infamy and brutality, and one wonders how Germany can ever hope to be again received on friendly terms by the Allied nations. Germany's wickedness is only equalled by her stupidity. By her actions she has forfeited all human sympathy and respect, and has placed an indelible stain on her once good name.

### REPATRIATION.

Let us now turn from the tragedy of war to the situation here and to our prospects in the near future. I take it that the study of the skies is given a great deal of attention by you gentlemen. Well, this year you have had almost too much of a good thing where the rainfall is concerned; and, although there are unfortunately portions of the pastoral areas which have not had as much rain as they require, generally speaking, the farmers and pastoralists are, I should say, in better heart than they have been for a long time, although the farmers had not much to complain of last year. However, they deserved all they got, and I trust that their patience and energies may be again rewarded this year. As to the future, we are chiefly concerned with the repatriation of our returned soldiers. The task, in that connection, is necessarily going to be a very difficult one—but the sooner we set to work to formulate a workable scheme, the better prepared we shall be to make a success of it. Three weeks ago I presided at a meeting at which was launched the Repatriation Fund, and I have every reason to think that it will not be for want of honest endeavor if a very difficult problem is not satisfactorily solved in this State. There is no doubt that the placing of returned soldiers on the land is going to prove a very expensive undertaking. At a conference held in February last, at which were present Government representatives of the Commonwealth and the several States, it was calculated that it would take £23,000,000 to settle 42,000 men on the land in three years—that is, at the rate of over £500 a man. Repatriation, however, does not only mean placing men on the land. It also aims at re-establishing our returned soldiers in civil life, and in assisting them to take up various trades and industries. I have on two occasions visited the Government Training and Experimental Farm at Pompoota, on the left bank of the River Murray, and it struck me that the project was an excellent one, and one which would confer great benefits upon those men who had the advantage of being trained at Pompoota. It is not every man who has the inclination to take up farming—and not all men are suited for such a venture. It is very difficult for any man to take up any particular line in life, and make a success of it, unless his heart is in the work. Soldiers are particularly handicapped in this connection. After the crash and bustle of active service, it is most difficult for a man to settle down to the ordinary avocations of life, and to take on contentedly the monotony of the daily task. This particularly applies in a country like Australia, where the areas are large and the population sparse. Loneliness is a feature of life which often strikes one as one travels through the back blocks of the State, where you see single habitations dotted sparingly about, miles and miles apart. The remedy for such a state of affairs is population—and no doubt in settling our fighting men on the land we shall place them in certain numbers on adjoining properties, and intersperse among them experienced settlers. In any case I take it that only those men who are suitable will be granted plots of land.

### ROSEWORTHY COLLEGE.

I am in hopes that when the war is over more advantage will be taken of the Agricultural College at Roseworthy, an excellent and well-run institution. A young man who has done a three years' course at Roseworthy only requires a small capital to become a very successful farmer. I have visited Roseworthy twice, and on each occasion I was very much impressed with the sound methods of teaching adopted there. I have also visited the Victorian Government Agricultural College at Dookie, where also the most modern methods of instruction are in vogue. The Dookie College is handicapped by being too much out of the way. I feel sure that greater use would be derived from that institution if it were, as Roseworthy is, near the State capital.

### POST-WAR TRADE.

Settling our returned soldiers on the land, or in some other walk of life, is no doubt the first after-war duty devolving on the several Governments. What is almost equally important is the question of after-war trade. Germany is already making tremendous preparations to flood the world with her goods, as soon as peace is declared. Her agents are purchasing raw material in many neutral countries, especially in South America, and on that continent exhibitions of German goods are being held. Looking ahead and preparing has been the secret of Germany's success in the past. That country achieved her preliminary successes in the war owing to her being prepared, whilst her adversaries were not. The first year and a half of this war was a startling example of the dangers attending unreadiness. It is perfectly clear that Germany is making great efforts to prepare a plan of campaign to wage a commercial war after the war is over. It is vitally necessary that we, on our part, should make similar preparations. There never was a time when it was so imperative, so vitally necessary, for British business men to watch commercial developments with the greatest attention. It may be news to you to learn that the publication of reports by British Consular officers has been suspended during the war, the reason being on the grounds of economy. Truth is indeed stranger than fiction. Those reports would be of the greatest value at the present time, if only for the purpose of indicating openings for British trade and in drawing attention to the activities of our competitors. What is wanted is an All-British Consular Service, under which salaried Vice-

Consuls would be appointed at all places of sufficient importance. These officers would devote their time exclusively to the duties of their office. They would not be traders, but men selected by their suitability for the work of trade representatives. If we had 500 such officers, at an average salary of £300 a year, it would amount to £150,000—surely an improvement on the present system, where there are 600 unsalaried Vice-Consuls, the majority of whom are natives of the country in which they are appointed.

### A NEW SPIRIT NECESSARY.

There is no doubt that, after the war there will be an immensely increased trade throughout the world, and we must do all we can now to acquire what were once enemy's markets. What is wanted is a new spirit in our systems. If we are to improve, it is essential that the employer and the employed should come together for the purpose of mutual protection. In that way alone can we lay the sure foundation of preparedness. Capital and labor must come to some working arrangement, and recognise their joint responsibility for the welfare of the people, if we are to hold our own in international competition. Some means must be found to enlighten the working men as to the imminence and reality of the commercial peril brought about by the war. The Paris Economic Conference laid down the foundations on which the Allied Governments would act in commercial matters after the war. The special measures to be devised will vary with the different industries and localities; but all measures must be considered and applied in the same spirit in which the war is being fought. (Applause.)

On the motion of Mr. A. M. Dawkins, seconded by Mr. G. R. Laffer, M.P., a hearty vote of thanks was accorded His Excellency for his attendance at the Congress and his opening address. His Excellency briefly replied.

## MINISTER OF AGRICULTURE'S SPEECH.

The Minister of Agriculture said that it was a proud occasion for him to stand there as head of that splendid organisation, the Agricultural Bureau. He had had the honor of being secretary and also president of one of its branches, and had also been a delegate to the annual congress. He had now the greater honor of being present as the Ministerial head of the Department and delivering an address. It was a coincidence that the last time he appeared in Congress one of the suggestions was that the membership should be unlimited. Before that it had been restricted to a certain number. His friend, the present Chairman of the Board, seconded the motion which he had moved, but it was defeated. It was, however, carried at a later

Congress, and they could now have a branch wherever they wished and as many members as they cared to elect in the branch. It had been a good thing for South Australia, and, if so, they could not have too many farmers and agriculturists in it. The same organisation existed not only in the agricultural areas, but in the irrigation areas, and it promised well for the future of agriculture and the irrigation industry. Whilst sojourning in South Australia His Excellency had seen the extremes in regard to the seasons. They had passed through the worst drought on record since His Excellency had arrived, and he hoped they would not have a repetition of that experience. He did not think it probable that the Governor would live to see such a thing again, because it was not within the knowledge of white men to have such a visitation. His Excellency had also seen the wettest winter on record. They had had a most bountiful harvest last year, and it would, they hoped, be equalled, if not excelled, in the present year. After such a drought, they could stand two good seasons.

### War Obligations.

His Excellency had referred to the awful war and the cloud that still hung over them. It was their first duty to win the war. They could not predict when the end would come, but they could predict what it would be. It would be the triumph of right over wrong and of right over might, so that Prussian militarism would no longer threaten the world. They would not be content with a decision which would only last for a little while. If the power of militarism were not utterly broken, they would have to face again, before many years, a similar world's catastrophe. The sword therefore would not be sheathed until the international criminal had been put in his place.

### The Wheat Scheme.

The farmers had a duty to perform to the nation. If their wheat must wait because the needs of the Admiralty made it practically impossible to secure freight, then it must stay in the stacks. The war had to be won, and everything else was a secondary consideration. (Hear, hear.) The Government had many difficult problems to face arising out of the war. The great wheat scheme had been an outcome of the war, and he assured the Congress that it was not entered into from any political motive, but had been looked at purely from a business point of view. It had been found at the outset that it would be practically impossible for private individuals to secure freight, and that if they were able to get any it would be at such a cost as would give the farmers little or no return. In the Argentine that day they were paying 170s., but they could afford to pay it there, because the distance from the London market was much less than in the case of Australia. Farmers at this end of the world could not have afforded to pay anything like it. And if it had not been for the scheme they would have received much less than had been paid, not taking into consideration the extra 6d. He felt that the scheme had justified itself, and he would leave it at that.

### BULK HANDLING OF WHEAT.

With regard to the bulk handling of wheat, he would say that His Excellency had referred to the organisation of the industry and doing the utmost to secure the best results from the soil, and he thought that bulk handling would give greater economy in dealing with their staple product than was the case at present. If that idea were wrong, they wanted to know it, and he would give every opportunity for discussion. He hoped when the matter came before them they would consider it carefully and not allow their good judgment to be affected by anything in the way of political prejudice. The system should be judged on its merits. If it could be shown that the bag system was the best thing for them in handling wheat, let them use bags, but if that were not so, let them adopt bulk handling. It should, in that event, not be a question of whether the time was opportune or of what the scheme was going to cost. Business men did not hesitate to pull down factories and scrap machinery in favor of better and newer ideas, and farmers should do their best to arrive at a conclusion on the same basis. He asked them to have an open mind on the subject, and, until they had heard all that would be explained to them, not to sign petitions that were being circulated for political purposes.

### AFTERMATH OF THE WAR.

Briefly, he wished to direct their attention to what they must be prepared to do to meet the aftermath of the war. There were soldiers coming back in a more or less disabled condition. Their duty was to be prepared to receive them and find them a place in their midst where they could secure a livelihood in conditions which were congenial to them. South Australia was the first to establish a training farm in connection with the irrigation areas. The Governor had referred to the excellent work at the Pompoota Settlement for returned soldiers. The Government had recognised that there would be difficulties to contend with there, but they were prepared to face their responsibilities and the difficulties, and they went through with it. He hoped young men would not think their duty to their country was finished because they had gone to the front and fought, but that they would carry the same spirit to win through in whatever sphere they might afterwards be placed. Excellent work was being done on the Government training farm at Pompoota to fit the returned soldiers for an agricultural career, and he felt sure that when those young men went out and took up land for themselves they would receive the sympathetic assistance of those whose farms were close to them, and who, for good reasons, had not been able to go to the front. The Government would do their share in providing occupation for those who came back from the war, and, if the farmers put their land to greater productive capacity, they would be serving their country in the same spirit as the soldiers who had gone to the front.

### FOSTERING RURAL INDUSTRIES.

The Government were determined by every means in their power to foster the rural industries, for they recognised that it was only by closer settlement and greater development of the land already under occupation, and that which was to be occupied, that they could increase the productiveness of the land and that industries might be established in other directions. Science would be brought to the aid of the farmer. It was true that the farmers were the backbone of the country, but he wished them to understand that the backbone without the limbs would be of very little service. As tillers of the soil they were dependent upon other industries, and the man who dug from the bowels of the earth the coal and the iron ore was a producer of wheat in the economic sense, as he made possible the means of tilling the ground that the wheat might be sown. It was by closer settlement, the closer application of science, the utilisation of the best methods of cultivation, the setting aside of slovenliness, and the putting of first class, thorough work into the farms that they would make the land a means of producing a greater amount of wealth than it did to-day, and also enable a greater amount of wealth to be shared by the whole community. The Government were prepared to push closer settlement to its utmost capacity. The Mount Remarkable Estate had recently been purchased, and would be set aside for the settlement of soldiers, with a training farm fitted out under the direction of Professor Perkins, under a scheme which would include among other things instruction in cereal production and live stock raising. A capable manager had been secured, and they would be in a position within the next week or two to receive soldier trainees at the farm. The most up-to-date methods of scientific agriculture would there receive attention.

### EXPERIMENTAL WORK.

Agricultural tractors had been secured, and were being given a trial with a view of ascertaining whether they were cheaper than horse-drawn implements. He thought that was an experiment the Government were wise to undertake. If it proved to be more costly than horse traction, the maker would have to develop it until it became less costly, or else it would be put aside altogether. It was, however, the intention of the Government to see how far the cost of agriculture could be lessened by the use of power machinery for agricultural purposes. In connection with wheat production, no effort would be spared in the direction of experimental work with a view to the introduction of better varieties, and the selection of those which would give the greatest yields under different climatic conditions. That would not be confined to wheat, but would apply also to oats. He had authorised that at Tailem Bend. At the conference at Tailem Bend some doubts were expressed as to the best oats to grow. They would have tests made in that and any other district where it was necessary.

### Stimulating the Dairying Industry.

They hoped to stimulate greater activity in the dairying industry, which had been neglected in South Australia, and they proposed in connection with herds in the metropolitan area to initiate a scheme by means of which the progeny of some of the best cows in the State would be taken to a depot, reared, and made available to dairymen when they reached maturity. The scheme would be propounded in the course of the next few weeks. It was a shame that valuable young stock should be slaughtered, when they had such a dearth, not only of young stock, but in their dairy cattle and their flocks and herds generally. Whilst in Victoria recently he had discussed with the authorities there the methods in regard to the subsidising of silos, and he had the authority of Cabinet to institute a policy similar to that in Victoria in regard to the erection of fodder silos for the dairy farmers of South Australia. Farmers who made application would have advanced to them, on easy terms, money for the erection of those silos.

### Mixed Farming.

For the encouragement of mixed farming it was hoped to organise co-operative effort, and in connection with the soldiers' settlements at Mount Remarkable and Kangaroo Island, to have bacon and butter factories. It was desired to foster the pig-raising industry to the utmost possible extent, and in that relation the export trade would have to be developed. The pig increased and multiplied very quickly. When prices were high, people rushed into the industry, and when prices fell they rushed out again. They wanted to increase the consumption among their own people, and they hoped also by the system of co-operative settlements and co-operative factories to establish an export trade overseas and supply some of the markets of the world from South Australia.

### FRUIT GROWING.

In connection with fruit growing, there was room for great development. A visitor from France said that he saw more land uncultivated between Adelaide and Blackwood than he had seen in the whole of France. They had scope about Adelaide, in Kangaroo Island, and on the banks of the Murray for greater development, but it would have to keep pace to some extent with the population. They must progress in the eating of their own products, for by doing so they would be contributing to their own health, to the welfare of the man on the land, and the welfare of the whole community. In connection with Eyre's Peninsula Experimental Farm they hoped to lay out a model farm. The Director of Agriculture had planned that the land should be planted round with olive trees. The climate of the State lent itself to the production of olives and olive oil, and there was no reason why it should not be developed into a greater industry than it had been in the past.

### IRRIGATION.

The Government policy in regard to irrigation was one of full steam ahead. They could not move too fast in that direction. They proposed to establish in connection with the irrigation settlement, a farm under the Director of Agriculture, where experiments could be carried out. One of the experiments to be tried would be maize growing. They should produce at least enough of that for home consumption, if not for export. They should not import from Queensland and New South Wales if they could produce it for themselves. The Government would go in for a vigorous policy in connection with all the rural industries.

### CONCLUSION.

They had heard a great deal recently in connection with the rooting out of German names and of things made in Germany which they had been accustomed to use. He had nothing to say against that. Let them go. But if they were getting rid only of the German names and goods, and adhered to the German methods and principles, they were only getting rid of the husk and keeping the kernel. The doctrine which had imposed that war upon the world was that might should triumph over right, and the rights of the little nations and minorities might be disregarded, and also the doctrine that the end justified the means, which was one of the German fetishes, and though wrong in itself, it was hoped by that means to enhance German power and German prestige. That was a damnable creed, and should be rooted out stock and branch. There were, however, many things in their organisation, and the application of science to industry, which they could learn from Germany. They were not going to become a great country by taking short cuts, or what they conceived to be short cuts, to the attainment of their destiny. Nations which took short cuts by wrongdoing to what they conceived to be their advantage, would find, as Germany had, that their scheming would bring them to a terrible end sooner or later. They must learn the lesson to do right because it was right regardless of consequences, and so they would become a great nation, or there was no power in democracy. (Applause.)

## WORK OF THE BUREAU.

The Chairman said that there was no Congress last year and no show, and therefore the review he proposed to make was that of the Advisory Board for the past two years. First of all there was the question of the Chapman cornsack. They considered that a sack 23in. x 41in. when filled should be considered a legal sack. They appealed to the Federal Customs authorities on that point, but although they had the support of the Federal members, the Customs authorities insisted that the wheat and cornsack should not exceed 200lbs. in weight. A committee had been appointed to draft resolutions in regard to the effect of vermin upon sheep, especially in the South-East. The result was that a line had been drawn, and an infected area declared, and it had been provided that sheep in that area must be dipped and that an arsenical powder, poisonous dip, must be used on every occasion. While the question of an irrigation college on the Murray was deemed quite unnecessary, yet the need for instruction and guidance in all branches of agriculture, horticulture, and stock raising among the reclaimed areas of the Murray had very strongly appealed to them, and the Board had made recommendations that the Government should provide assistance to the settlers. The question of farming apprentices had engaged their attention, and they had recommended that something should be done in that direction. In regard to the destruction of noxious weeds and rabbits, nothing would be accomplished until a department was organised with an inspector who had power to enforce the regulations on the lines of the Stock and Brands Department. District councils were often the greatest offenders in regard to noxious weeds, and they would not take steps in regard to the noxious weeds growing on their own lands. The Board had suggested that a bonus should be offered for a shoot scorcher, but that had had to stand over for the time being. It was imperative that they should help the mallee settlers who were winning a new province for South Australia, and deserved every help. During the past year there had been seven conferences, and the experts and officers of the department had attended and provided a greater portion of the papers. If the conferences were to maintain their character, at any rate half the programme should be supplied by the Branches forming the conference. They had excellent officers, who had done most excellent work. He referred especially to the work of Mr. Henshaw Jackson (Wool Expert), who insisted on the farmers raising more sheep, and who instructed them how to raise them, how to feed them, and how to dispose of the produce. Mr. Jackson said that 93 per cent. of the wool which South Australia had sent to the market was comprised of consignments of less than 50 bales. Therefore it was the general farmer, the small sheep farmer, who supplied more than 90 per cent. of the wool in the State. Mr. Jackson said that it would pay better to feed hay to sheep than to sell it at 30s. or 35s. per ton. He deserved assistance. He was working single-handed, and he hoped his efforts would bear fruit before long. Mr. Nicholls, the Secretary, who was an excellent officer, was now engaged on the Wheat Board, and the work of the Advisory Board had fallen upon Mr. Finnis, who had carried out his duties admirably. During the year 18 new Branches had been opened, and there were now 190 Branches, with over 4,000 members. The work of the Hon. Secretaries of the different Branches had been excellent, for it must be remembered that they held a position which was not to be coveted. Over 365 young men, members of the Branches of the Agricultural Bureau, had left their farms and gone to the front. It had been a serious matter to some of the Branches, and one or more had been compelled to ask to go into recess until after the war. For the future he felt that, whether their destiny lay in the extension of their agricultural lands by reclaiming more mallee, or by increased cultivation of present holdings, they needed more grit, more determination, more hard work, and the resolution to extract as much as possible from the soil during the next few years to meet their heavy responsibilities. In South Australia the land not cultivated was 7.12 in excess of the other States. The State's wheat-growing area was not unlimited, and they must increase the cultivation in the areas under cultivation, grow more stock, fatten more sheep, grow more wheat by increasing the yield per acre, produce more butter from each cow, more eggs from each fowl, more fruit from the orchards and finer, in order that they might increase production, and so meet their heavy responsibilities as they came along. (Applause.)

*(To be continued).*

# ADVISORY BOARD OF AGRICULTURE.

The usual monthly meeting of the Advisory Board was held on Wednesday, October 20th, there being present Messrs. F. Coleman (chair), G. R. Laffer, M.P., W. J. Colebatch, T. H. Williams, A. M. Dawkins, C. J. Tuckwell, J. Miller, and H. J. Finnis (Acting Secretary).

## MILL PRODUCTS.

The Board decided to seek a report from the Chemistry Department on the feasibility of standardising mill products for sale.

## ROADS.

A sub-committee, consisting of Messrs. Laffer, Dawkins, and the Acting Secretary was appointed to communicate with Branches of the Bureau with a view to ascertaining their opinions on the question of protecting roads from damage due to excessive loading, and other matters affecting roads legislation.

## WOMEN'S COUNTRY CLUBS.

Arising out of a resolution received from the Hartley Branch, and a communication from a convention held under the auspices of the Farmers and Settlers' Association, the Board gave consideration to a suggestion from the Acting Secretary in relation to the formation of women's clubs in country centres throughout the State. The Acting Secretary expressed the view that it was desirable that women in country districts should be enabled to secure instruction in such subjects as home sanitation, home architecture, first aid, dietetics, hygiene, &c., in addition to poultry keeping, dairying, horticulture, etc. He recommended to the consideration of the Board a proposal for the formation of "Women's Country Clubs," and outlined a scheme with that end in view. It was decided to give further consideration to the proposal at a future meeting.

## EXEMPTIONS FROM COMPULSORY SERVICE.

The Board endorsed a request from the Willowie Branch to the effect that farm laborers might be exempted from compulsory military service until after harvest, and referred the matter to the Minister of Agriculture.

## BULK HANDLING OF WHEAT.

The opinion was expressed that every facility should be given Branches to discuss the question of handling wheat in bulk, but it was undesirable that resolutions supporting or condemning the system should be submitted.

### New Branches.

Approval was given to the formation of a new Branch at Mundalla; 219 names were added to the rolls of existing Branches.

### Wheat Stacks.

Mr. Miller reported having noticed a considerable amount of waste around the wheat stacks in the north. It was decided to draw the attention of the Wheat Harvest Board to this matter, with the idea of ascertaining whether steps could be taken to prevent the waste.

### Conference of Owners of Dairy Factories.

At the instance of Mr. C. J. Tuckwell, it was decided to take steps to ascertain the feelings of dairy factory managers on the question of holding a conference for the purpose of discussing matters of mutual interest.

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# MILK FEVER OR DROP AFTER CALVING.

[By F. E. Place, B.V.Sc., M.R.C.V.S., Government Veterinary Lecturer.]

Numerous inquiries from districts as widely separated as Mount Gambier, Pinnaroo, and Willaloo show that this disease is common in South Australia, and yet not generally recognised by cowkeepers. The name "milk fever" is unfortunate, as the milk has practically nothing to do with the symptoms, and so far from being a fever, the temperature is, as a rule, considerably below normal, so that the Devonshire name, "the drop," is more appropriate.

A typical case follows a course of this description:—The cow has her third, fourth, or later calf, and the birth is an easy one; sometimes help is rendered, but the ease with which the calf is delivered has an important bearing on the onset of an attack. The cow is usually in very good condition or improving, and as a rule is an easy-going, lymphatic beast.

Some hours after calving, varying from three to as many days, she may be noticed to be uneasy, lowing, and paddling with her hind feet, and her eye is staring as if she had a bad headache, which is a fact. These early symptoms are often overlooked, the paddling is put down to her having recently calved, and the lowing and staring to nervousness for her calf.

A few hours later she is down and unable to rise, possibly moaning, and her head is swung round to her flank, losing consciousness, tossing herself about, and probably blowing up; bowels and bladder seem to suspend work, and after a day or two she dies or gradually comes round, in which case there is probably acute constipation and more or less stiffness or actual lameness persisting in one or other hind leg, and if she has been drenched she is probably coughing and discharging from the nose, and may develop the symptoms of pneumonia and die about a fortnight later. It will be noticed in this list of symptoms that the udder has not been mentioned. There is no need for it; the heat, pain, and distension that many people describe exist only in the imagination.

Now for the treatment; prevention will be touched on later. *Do not drench.* The cow is a patient beast, and in this disease a form of paralysis is creeping on, and what is poured into her mouth is as likely to go the wrong way as the right, hence the inflammation of the lungs, which kills so many. *Do not milk out.* Stripping the udder is one of the main causes of the collapse, and the best plan is to leave the milking business to the calf, or if he is unable to undertake it, only ease the udder during the first twenty-four hours.

As soon as the symptoms are distinguished, blow up the unstripped udder with air, quarter by quarter, with a milk fever apparatus if at hand, but a milk syphon or a quill on a bicycle pump will do equally well at a pinch, massaging the udder well as the air is blown in until it is firm and tense. As a rule it is not necessary to tie the teats, but if they are flabby and lax a broad tape may be tied round their base. Doubling them up is not required, and the tape should not be over tight nor left on too long.

It is necessary that all the apparatus should be quite clean; udder troubles that follow in some cases are due to neglect of this precaution. The air filter that is attached to the apparatus will not compensate for dirt in the tube. Swilling with cold water and then boiling is the best way of cleaning the gear. This should be done both before and after use.

After the operation prop the cow on her breast so that her weight is on her abdomen and udder, and make her as comfortable as possible. It is well to get her to pass urine by rubbing the bearing, and if the bowels are bound up, empty them with an enema. Shelter her from cold or heat, and if very uneasy, apply ice poultices or cold swabs round the base of the horns.

As a rule in as many hours as she has been down before treatment, in so many will she get up again, but it is not advisable to let too many elapse before commencing, and in some obstinate cases, and in others where the air has escaped too rapidly, the blowing up will have to be repeated to keep the udder tense. Do not hurry her up, but be ready with help when she begins to try, and when she is up let her have a bran mash and a little hay.

*Do not be in a hurry to milk her out,* but just make her udder comfortable. For a few days give her 10 drops of tincture nux vomica on her tongue three times a day, and she will come into full profit as usual.

Why has such simple treatment so good an effect, when in past times vigorous treatment such as bleeding, gallons of whisky, and potent drugs like strychnine, failed? Because the symptoms are the result of a mechanical interference with the circulation. The blood, which has been going to nourish the calf before birth, has to be diverted to the udder as it becomes functionally active, and the quick, easy parturition of the plethoric animal results in a back suction into the large veins of the abdomen, bringing about congestion in them, and depriving the intricate vessels of the brain of their share, hence the head symptoms, the drop in temperature, and the drop of paralysis, the sudden onset, and the equally rapid recovery because the air pressure regulates the circulation.

Prevention consists in keeping the cow in hard, healthy condition, giving her a fair rest between lactation periods of a month or so, letting her live hard and get plenty of exercise during gestation, and especially so for the weeks just before calving, keeping her bowels regular, preferably by diet, but if necessary by an occasional drench of ¾lb. to 1lb. of Epsom salts with an ounce of ginger in a quart of warm water.

Complications that arise, such as hoven when she is down, or pneumonia after getting up, or lameness, must be treated in the usual ways demanded by such diseases. Stab for hoven or put tar on the tongue, or both. For pneumonia, keep the temperature down with aconite and belladonna or small doses of 2-4ozs. salts and rub liniment into the sides of the chest. For lameness give 10 drops tr. rhus. tox. twice a day and rub the quarter and leg well with liniment. One attack does not render a cow immune to another, but it is not usual for her to have a second unless her temperament is very conducive to an attack.

Simple though the treatment is, the preventive measures indicated are much more valuable.

# DIPPING SHEEP.

The Chief Inspector of Stock (Mr. T. H. Williams) has supplied the following points for sheep owners:—

1. The Amending Stock Diseases Act of 1915 provides that all sheep in the electoral district of Alexandra, including Kangaroo Island, the district of Albert south of the railway line running from Tailem Bend to the Victorian border near Pinnaroo, and the district of Victoria, shall be dipped between the 1st day of September in every year and the end of January in the following year.

2. All sheep must be dipped in a poisonous powder dip as provided by proclamation under the said amending Act.

3. The instructions for mixing the dip are on every packet, and they must be strictly followed, if the object for which the sheep are dipped, *i.e.*, the destruction of lice and ticks, is to be successful. Keep the dip at full strength.

4. Sheep must be kept in the bath not less than one minute.

5. Sheep infected with lice should be dipped twice within 14 days to thoroughly cleanse them.

6. Do not fail to muster and dip all stragglers on the holding.

7. The best time to dip sheep is when they have from four to six weeks' growth of wool on them.

8. Owners should examine the sheep frequently and satisfy themselves that they are free of vermin.

9. Wool from sheep free of vermin will bring top prices, while that from infected sheep will have deteriorated from 25 to 45 per cent.

10. Lice-infected lambs at five to six months old will not be as valuable by 50 per cent. as the clean animal

11. Owners of small lines of sheep should club together and procure a portable dip.

12. Any further information required on this important matter can be obtained upon application to the Chief Inspector of Stock, Stock and Brands Department, Adelaide.

# THE AGRICULTURAL OUTLOOK.

## REPORT FOR THE MONTH OF SEPTEMBER.

*Booborowie.*—Weather—The first three weeks of this month were very dry; hot days and strong drying winds were prevalent; the third week, on September 22nd and 23rd, splendid rains fell, and over 180 points were registered. Crops on stubble land are very poor, but should receive great benefit from the rain which fell. Natural Feed—There is not much growth in the feed; the late winter and dry weather following immediately was very much against it. Stock are looking well and beginning to top up nicely. Miscellaneous—Sheep farmers are experiencing some difficulty in obtaining shearers, so many having gone to the front.

*Eyre's Peninsula.*—Weather—The first three weeks recorded fine, rather warm, and dry weather, shade temperatures reaching up to 90deg., and only four or five damp mornings were observed. Two splendid days' rain followed, registering 2¼in., and the last week has been cool with light showers and southerly breezes. North breezes were recorded on six days during the dry part of the month, and these checked crop growth somewhat, especially that of oats. Crops are now promising very well; some of the early varieties have completed flowering. Loose smut is showing rather plentifully. Charlock is becoming thick in the district, but is not much in evidence amongst the crops this year. Natural feed is good, and running to seed; the speargrass (*Astipa pubescens*) has made considerably the most growth. Pests—Rabbits are multiplying quickly, and settlers are well at them with traps, etc. Cutworms are plentiful, and the recent dry spell gave the aphides an accepted opportunity to make inroads on the few local vegetable patches.

*Turretfield.*—Weather conditions during the first three weeks of September were exceptionally dry and hot. No rain fell until the 21st, and on that and the three following days a total of 155 points was recorded. After the wet winter this short hot and dry spell caused the soil to set very hard, and the downpour of rain proved most welcome and beneficial. All crops were beginning to show the effects of the hot dry weather, and especially so the oat crops. They have freshened up well after the rain, and given favorable conditions, should now make good headway. Natural feed is still abundant. All stock are healthy and in fair to good condition. Pests—The caterpillars of which mention was made in last month's report have completely disappeared. Miscellaneous—Fallowing operations have been rather hampered this season. First the very wet weather rendered work on the land impossible, and during the dry spell this month the surface soil dried so quickly and set so hard that fallowing had again to be suspended. The timely rain has enabled work to be resumed.

*Veitch.*—Weather conditions during the month have been satisfactory for cereal growing; the rain gauge registered 252 points. The average for the month is 184 points. About the middle of the month a few rather warm days were experienced. Crops throughout the district are now showing a nice healthy color, and making good growth. The early sown fields are out in ear and look promising. Good feed is now available on all burnt scrub land. Stock are all in good condition. Miscellaneous.—Scrub rolling and fallowing operations are now nearing completion.

# RAINFALL TABLE.

The following figures, from data supplied by the Commonwealth Meteorological Department, show the rainfall for the month of and to the end of September, 1916, also the average precipitation to the end of September, and the average annual rainfall.

| Station. | For Sept., 1916. | To end Sept., 1916. | Av'ge. to end Sept. | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| **Far North and Upper North.** | | | | |
| Oodnadatta | 0·11 | 5·86 | 3·70 | 4·76 |
| Tarcoola | — | 3·25 | 5·87 | 7·58 |
| Hergott | 0·66 | 3·08 | 4·64 | 6·04 |
| Farina | 0·85 | 4·69 | 5·20 | 6·70 |
| Leigh's Creek | 0·79 | 4·50 | 6·90 | 8·66 |
| Beltana | 1·02 | 5·88 | 7·22 | 9·22 |
| Blinman | 1·41 | 9·64 | 10·37 | 12·83 |
| Hookina | 2·56 | 14·52 | — | — |
| Hawker | 1·92 | 14·58 | 9·71 | 12·22 |
| Wilson | 1·68 | 13·87 | 9·41 | 11·78 |
| Gordon | 1·73 | 10·68 | 7·98 | 10·26 |
| Quorn | 1·42 | 14·51 | 11·03 | 13·78 |
| Port Augusta | 1·59 | 8·13 | 7·48 | 9·46 |
| Port Augusta W. | 1·64 | 8·20 | 7·41 | 9·36 |
| Bruce | 1·16 | 8·94 | 7·95 | 10·01 |
| Hammond | 1·25 | 9·27 | 8·96 | 11·46 |
| Wilmington | 1·94 | 16·52 | 14·75 | 18·26 |
| Willowie | 1·63 | 11·31 | 9·51 | 11·90 |
| Melrose | 2·10 | 23·58 | 8·78 | 23·04 |
| Booleroo Centre | 1·71 | 13·92 | 12·71 | 15·83 |
| Port Germein | 1·57 | 6·80 | 10·18 | 12·84 |
| Wirrabara | 2·32 | 21·89 | 15·31 | 18·91 |
| Appila | 1·84 | 12·95 | 11·86 | 15·08 |
| Cradock | — | 8·24 | 8·49 | 10·86 |
| Carrieton | 1·47 | 12·13 | 8·98 | 12·22 |
| Johnburg | 1·45 | 9·04 | 7·32 | 10·21 |
| Eurelia | 1·52 | 12·06 | 10·45 | 13·24 |
| Orroroo | 1·34 | 12·30 | 10·64 | 13·42 |
| Black Rock | 1·77 | 11·74 | 9·57 | 12·25 |
| Petersburg | 1·73 | 11·83 | 10·18 | 13·07 |
| Yongala | 2·39 | 14·59 | 10·85 | 13·94 |
| **North-East.** | | | | |
| Ucolta | 1·92 | 10·29 | — | — |
| Nackara | 1·65 | 9·05 | — | — |
| Yunta | 1·43 | 7·16 | 6·15 | 8·22 |
| Waukaringa | 1·95 | 7·98 | 6·07 | 7·94 |
| Mannahill | 1·62 | 7·18 | 6·22 | 8·46 |
| Cockburn | 2·07 | 8·13 | 6·08 | 7·97 |
| Broken Hill, NSW | 2·44 | 7·83 | 7·40 | 9·63 |
| **Lower North.** | | | | |
| Port Pirie | 1·57 | 12·48 | 11·62 | 13·21 |
| Port Broughton | 1·38 | 15·60 | 11·68 | 14·33 |
| Bute | 1·89 | 17·60 | 12·77 | 15·42 |
| Laura | 1·93 | 17·21 | 14·58 | 18·22 |
| Caltowie | 1·75 | 14·87 | 13·60 | 17·27 |
| Jamestown | 2·15 | 16·86 | 13·75 | 17·46 |
| Gladstone | 1·81 | 14·01 | 12·67 | 16·00 |
| Crystal Brook | 1·81 | 14·99 | 12·51 | 15·62 |
| Georgetown | 1·87 | 17·16 | 14·77 | 18·32 |
| Narridy | 1·22 | 13·44 | 12·59 | 16·79 |
| Redhill | 1·59 | 17·54 | 14·71 | 16·79 |
| **Lower North—*continued.*** | | | | |
| Spalding | 2·03 | 19·98 | 16·17 | 20·25 |
| Gulnare | 1·79 | 18·09 | 15·78 | 19·74 |
| BundaleerW.Wks. | 2·00 | 18·49 | 13·63 | 17·29 |
| Yacka | 1·62 | 15·69 | 12·37 | 15·27 |
| Koolunga | 1·72 | 15·97 | 12·89 | 15·94 |
| Snowtown | 1·94 | 18·77 | 12·84 | 15·70 |
| Brinkworth | 2·00 | 18·32 | 12·59 | 15·48 |
| Blyth | 2·15 | 17·20 | 13·31 | 16·34 |
| Clare | 1·89 | 25·60 | 19·85 | 24·30 |
| Mintaro Central | 2·18 | 26·57 | 17·81 | 21·99 |
| Watervale | 3·09 | 28·85 | 22·22 | 27·17 |
| Auburn | 2·25 | 20·70 | 19·78 | 24·25 |
| Hoyleton | 1·91 | 14·94 | 15·20 | 17·96 |
| Balaklava | 1·80 | 13·27 | 12·81 | 16·03 |
| Port Wakefield | 2·33 | 14·01 | 10·28 | 13·13 |
| Terowie | 2·30 | 11·87 | 11·56 | 13·71 |
| Yarcowie | 2·51 | 13·45 | 11·97 | 13·91 |
| Hallett | 1·85 | 14·04 | 13·29 | 16·40 |
| Mount Bryan | 1·95 | 19·99 | 12·83 | 15·73 |
| Burra | 1·82 | 20·19 | 15·35 | 17·82 |
| Farrell's Flat | 1·60 | — | 15·39 | 18·87 |
| **West of Murray Range.** | | | | |
| Manoora | 2·26 | 18·66 | 14·62 | 18·09 |
| Saddleworth | 2·18 | 16·36 | 15·95 | 19·69 |
| Marrabel | 2·08 | 22·93 | 15·33 | 18·94 |
| Riverton | 2·22 | 21·40 | 15·64 | 20·48 |
| Tarlee | 1·95 | 16·71 | 13·93 | 17·48 |
| Stockport | 2·06 | 17·59 | 12·66 | 15·89 |
| Hamley Bridge | 1·87 | 16·07 | 13·21 | 16·45 |
| Kapunda | 2·15 | 20·19 | 17·88 | 19·67 |
| Freeling | 1·84 | 18·40 | 14·27 | 17·85 |
| Greenock | 2·20 | 25·11 | 17·12 | 21·46 |
| Truro | 1·85 | 21·39 | 15·98 | 19·74 |
| Stockwell | 1·90 | 20·76 | 16·25 | 20·30 |
| Nuriootpa | 1·85 | 22·19 | 17·13 | 21·25 |
| Angaston | 1·97 | 24·53 | 17·90 | 22·25 |
| Tanunda | 1·85 | 22·37 | 18·05 | 22·28 |
| Lyndoch | 1·74 | 20·21 | 19·89 | 23·01 |
| **Adelaide Plains.** | | | | |
| Mallala | 1·78 | 13·84 | 13·65 | 16·88 |
| Roseworthy | 1·62 | 15·90 | 13·92 | 17·31 |
| Gawler | 1·73 | 19·44 | 15·58 | 19·21 |
| Two Wells | 1·53 | 14·66 | 13·37 | 16·36 |
| Virginia | 1·51 | 16·39 | 14·30 | 17 58 |
| Smithfield | 1·71 | 17·02 | 13·93 | 17·30 |
| Salisbury | 1·53 | 11·98 | 15·18 | 18·57 |
| North Adelaide | 1·97 | 25·03 | 17·59 | 21·49 |
| Adelaide | 1·68 | 21·72 | 17·32 | 21·04 |
| Brighton | 2·23 | 22·15 | 16·38 | 19·93 |
| Glenelg | 1·82 | 19·63 | 15·13 | 18·35 |

## RAINFALL—*continued.*

| Station. | For Sept., 1916. | To end Sept., 1916. | Av'ge. to end Sept. | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| **Adelaide Plains—*continued.*** | | | | |
| Magill | 1·47 | 20·72 | 22·28 | 25·69 |
| Glen Osmond | 1·94 | 26·82 | 20·74 | 25·26 |
| Mitcham | 1·79 | 24·07 | 19·47 | 23·47 |
| Belair | — | — | 23·86 | 28·64 |
| **Mount Lofty Ranges.** | | | | |
| Teatree Gully | 1·76 | 25·16 | 23·13 | 28·19 |
| Stirling West | 2·74 | 43·82 | 38·94 | 46·70 |
| Uraidla | 2·94 | 44·24 | 37·27 | 44·35 |
| Clarendon | 1·84 | 30·17 | 27·93 | 33·67 |
| Morphett Vale | 2·07 | 21·73 | 19·07 | 23·32 |
| Noarlunga | 2·58 | 19·97 | 16·92 | 20·28 |
| Willunga | 2·45 | 24·20 | 21·67 | 25·98 |
| Aldinga | 2·09 | 19·52 | 16·95 | 20·34 |
| Normanville | 1·94 | 21·83 | 17·23 | 20·65 |
| Yankalilla | 2·25 | 35·69 | 19·41 | 22·78 |
| Cape Jervis | 0·75 | 13·39 | 13·75 | 16·34 |
| Mount Pleasant | 2·97 | 27·20 | 22·29 | 26·87 |
| Blumberg | 2·55 | 28·58 | 24·41 | 29·38 |
| Gumeracha | 2·45 | 30·83 | 27·41 | 33·30 |
| Lobethal | 2·54 | 35·50 | 29·62 | 35·38 |
| Woodside | 2·47 | 28·06 | 26·19 | 31·87 |
| Hahndorf | 2·53 | 28·64 | 29·41 | 35·45 |
| Nairne | 3·80 | 23·94 | 24·84 | 28·83 |
| Mount Barker | 3·71 | 29·79 | 25·57 | 30·93 |
| Echunga | 3·40 | 29·43 | 27·27 | 32·83 |
| Macclesfield | 4·96 | 28·77 | 25·28 | 30·72 |
| Meadows | 4·65 | 36·35 | 29·29 | 35·52 |
| Strathalbyn | 2·95 | 17·23 | 15·81 | 19·28 |
| **Murray Flats and Valley.** | | | | |
| Wellington | 1·81 | 12·43 | 11·90 | 15·01 |
| Milang | 1·62 | 10·66 | 13·19 | 16·08 |
| Langhorne's Brdg | 1·91 | 11·04 | 13·20 | 15·27 |
| Tailem Bend | 2·12 | 12·12 | — | — |
| Murray Bridge | 2·82 | 11·07 | 11·42 | 14·32 |
| Callington | 3·19 | 13·40 | 12·77 | 15·65 |
| Mannum | 2·76 | 9·92 | 9·45 | 11·67 |
| Palmer | 2·92 | 13·79 | 12·53 | 15·60 |
| Sedan | 2·06 | 12·84 | 9·63 | 11·92 |
| Blanchetown | 1·27 | 6·50 | 8·28 | 10·71 |
| Eudunda | 1·99 | 17·49 | 13·92 | 17·33 |
| Sutherlands | 1·80 | 11·63 | 8·36 | 10·60 |
| Morgan | 2·02 | 8·78 | 6·95 | 9·29 |
| Overland Corner | 1·74 | 7·68 | 8·59 | 11·42 |
| Renmark | 2·39 | 9·24 | 8·99 | 10·93 |
| Loxton | 2·58 | 11·92 | — | — |
| **West of Spencer's Gulf.** | | | | |
| Eucla | 0·79 | 8·24 | 8·36 | 10·13 |
| White Well | 0·60 | 9·87 | 7·48 | 9·67 |
| Fowler's Bay | 0·85 | 12·33 | 10·45 | 12·11 |
| Penong | 2·47 | 17·17 | 9·97 | 11·93 |
| Murat Bay | 2·35 | 12·46 | — | — |
| Smoky Bay | 1·68 | 12·11 | — | — |
| **West of Spencer's Gulf—*continued.*** | | | | |
| Streaky Bay | 1·36 | 13·71 | 13·33 | 15·31 |
| Port Elliston | 0·58 | 16·24 | 14·24 | 16·49 |
| Port Lincoln | 0·81 | 20·14 | 17·02 | 19·88 |
| Tumby | 1·07 | 13·15 | 12·56 | 15·00 |
| Carrow | 1·73 | 14·82 | — | — |
| Cowell | 2·02 | 8·61 | 9·48 | 11·76 |
| Point Lowly | — | — | 9·56 | 12·21 |
| **Yorke's Peninsula.** | | | | |
| Wallaroo | 1·86 | 15·24 | 11·64 | 14·05 |
| Kadina | 1·83 | 17·72 | 13·28 | 15·88 |
| Moonta | 1·77 | 17·81 | 12·63 | 15·22 |
| Green's Plains | 1·76 | 16·91 | 13·67 | 15·73 |
| Maitland | 2·03 | 24·73 | 16·61 | 20·08 |
| Ardrossan | 1·74 | 15·43 | 11·44 | 13·89 |
| Port Victoria | 1·38 | 18·33 | 12·61 | 15·20 |
| Curramulka | 1·60 | 18·09 | 15·31 | 18·51 |
| Minlaton | 3·00 | 21·55 | 14·53 | 17·41 |
| Stansbury | 2·94 | 17·14 | 14·17 | 17·06 |
| Warooka | 1·80 | 18·09 | 15·06 | 17·71 |
| Yorketown | 1·89 | 17·93 | 14·57 | 17·47 |
| Edithburgh | 1·80 | 18·34 | 13·68 | 16·48 |
| **South and South-East.** | | | | |
| Cape Borda | 0·86 | 21·30 | 21·83 | 25·09 |
| Kingscote | 1·23 | 18·94 | 16·04 | 18·95 |
| Penneshaw | 1·27 | 18·23 | 18·09 | 21·34 |
| Cape Willoughby | 1·62 | 22·28 | 16·34 | 19·69 |
| Victor Harbor | 1·91 | 15·85 | 18·44 | 22·18 |
| Port Elliot | 2·04 | 14·86 | 16·85 | 20·33 |
| Goolwa | 2·00 | 16·01 | 14·82 | 17·93 |
| Pinnaroo | 2·92 | 14·40 | 14·32 | 16·74 |
| Parilla | 2·44 | 15·34 | — | — |
| Lameroo | 2·81 | 16·12 | 12·94 | 16·55 |
| Parrakie | 2·80 | 13·79 | — | — |
| Geranium | 2·72 | 15·86 | — | — |
| Peake | 3·07 | 15·57 | — | — |
| Cooke's Plains | 2·18 | 15·52 | 11·83 | 14·74 |
| Meningie | 1·89 | 19·11 | 15·56 | 18·87 |
| Coomandook | 2·34 | 17·78 | — | 17·49 |
| Coonalpyn | 2·51 | 17·44 | 14·03 | 16·80 |
| Tintinarra | 2·96 | 18·33 | 15·11 | 18·78 |
| Keith | 2·57 | 16·66 | — | — |
| Bordertown | 2·74 | 16·26 | 15·53 | 19·76 |
| Wolseley | 2·77 | 16·26 | 13·92 | 17·72 |
| Frances | 2·82 | 15·27 | 16·03 | 20·74 |
| Naracoorte | 2·85 | 18·20 | 18·06 | 22·60 |
| Penola | 2·11 | 19·88 | 21·49 | 26·78 |
| Lucindale | 1·85 | 18·15 | 19·10 | 23·32 |
| Kingston | 1·62 | 19·82 | 20·63 | 24·73 |
| Robe | 1·41 | 24·51 | 20·91 | 24·69 |
| Beachport | 1·57 | 26·16 | 23·40 | 27·51 |
| Millicent | 1·67 | 27·85 | 24·53 | 29·25 |
| Mount Gambier | 1·83 | 23·89 | 25·77 | 32·00 |
| C. Nrthumberland | 1·38 | 12·11 | 22·06 | 26·63 |

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| Arden Vale & Wyacca | * | — | — | Gladstone | * | — | — |
| Arthurton | * | — | — | Glencoe | ‡ | — | — |
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| Pompoota | 242 | 12, 26 | 9, 23 |
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| Port Elliot | * | 21 | 18 |
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| Port Pirie | 227 | 7 | 4 |
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| Tantanoola | 250 | 7 | 4 |
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* No report received during the month of September. † Formal report only received.
‡ Held over until next month.

# ADVISORY BOARD OF AGRICULTURE.

## Date of Meeting—October 25th, 1916.

# THE AGRICULTURAL BUREAU OF SOUTH AUSTRALIA.

**Every producer should be a member of the Agricultural Bureau. A postcard to the Department of Agriculture will bring information as to the name and address of the secretary of the nearest Branch.**

**If the nearest Branch is too far from the reader's home, the opportunity occurs to form a new one. Write to the department for fuller particulars concerning the work of this institution.**

# REPORTS OF BUREAU MEETINGS.

## UPPER-NORTH DISTRICT.

## (PETERSBURG AND NORTHWARD.)

### AMYTON (Average annual rainfall, 11.82in.).

September 12th.—Present: 12 members and five visitors.

Header v. Stripper.—The cheapest and best way to take a crop off, asserted Mr. A. Wallace, in a paper entitled "Header v. Stripper," was to use the binder and header. It conserved the fodder for a dry season, and the crop could be handled without any heavy work. It was also the most advantageous method of cleaning the land, because the ground could be worked after any rain in the summer without being choked with straw. It also saved the trouble of burning and avoided the danger of fire. A crop cut in that way could be carted and threshed at leisure. Cut in the other way, there was a bustle to get the hay in before reaping, and there was always a bustle to get the reaping over lest a storm should come. When cut it had to be cleaned and the wheat carted in. The chaff had also to be carted before the stock were put in the paddock. Mr. W. Gunn said it would not pay to treat all crops as the paper recommended. Headed straw was not nearly so valuable as hay. A travelling thresher was best. Mr. Crisp did not consider that the extra value indicated would pay for the extra labor. He would cut a stack of straw for a stand by, besides saving all chaff. Mr. W. Baumgertel read a paper on the curing of meat.

COOMOOROO, June 17th.—A paper was read by Mr. I. Brown on the most suitable horse for the farm. He favored the Clydesdale and liked a short, strong-bodied horse, which, as a rule, required less feed than a leggy horse. Members generally agreed that a leggy horse should be avoided and that a thick-set horse looked better and commanded a better price.

HOOKINA, August 8th.—Mr. S. Stone read a paper on "The Labor Problem," and in the discussion which subsequently took place the opinion was expressed that the best means of overcoming the shortage of labor caused by enlistment, was co-operation. Mr. P. Murphy said that it was difficult to see profits in wheat-growing with wages so high and the price of wheat low. Mr. J. Carn and Mr. F. Stone said that wheatgrowing was profitable at 3s. per bushel.

HOOKINA, September 5th.—Mr. T. Kelly read a paper on preparations for gardening, in which he said that a garden should be dug to a depth of 2ft. to grow cabbages, because if the tap root struck hard ground the cabbage stopped growing and became hard. It was better to dig through the cabbages than mould them. The digging destroyed the weeds and kept the ground damp. The best varieties of cabbage were Enfield Market, Elman's Early York, and Dutch Drumhead.

WARCOWIE, July 15th.—Mr. E. Telfer read a paper on fallowing, in which he advised feeding off the weeds from the land which it was intended to fallow in the succeeding winter in order to prevent them seeding. In a discussion which ensued it was suggested that heavy clay land should be worked lightly, whilst the soil was moist, in the winter, and then ploughed more deeply in the spring, when it would work up to a finer tilth and remain in better condition over the summer.

WARCOWIE, August 12th.—Mr. G. Growden read a paper, relating some experiments which he was conducting, but which had not yet been completed, in regard to feeding off and harrowing over a crop of smutty wheat. The wheat was reappearing much more thickly than in the first instance. Discussion followed as to the effect of feeding off wheat crops, and the general opinion was that it was beneficial.

WEPOWIE, August 8th.—In a short paper on the education of young horses Mr. S. McMahon recommended, in the first place, good tackling, which was essential. To catch the young animal he preferred a loosebox in a small yard, and by means of a short stick the wildest colt could be caught by moving around after it until the stick could be placed on it. Then the colt should be approached gradually and grasped with a firm hand and held, no matter how violently it plunged. Then the halter should be adjusted, the bit put in the mouth, and the animal should be tied up with a stout rope. The horse should be thoroughly mouthed, and by good careful handling it could be taught to work quietly without any trouble. He preferred putting a colt straight into a team of good, quiet horses when fit, and he would soon learn to do the right thing. Attaching young horses to logs often taught them to kick and become jibs. Horses should always be put in good hands to be broken in, because a well-broken horse was always a good horse.

## MIDDLE-NORTH DISTRICT.

### (PETERSBURG TO FARRELL'S FLAT.)

### BLYTH (Average annual rainfall, 16.46in.).

Present: 13 members and two visitors.

The Harrows.—Dealing with the use of the harrows on the farm Mr. W. O. Eime, in a short paper, said that in the first place that implement should be put over the land as soon as possible after the fallow had been ploughed. If horse strength permitted the harrows should follow the plough, and subsequently cross the field. Land that had been lying out should be harrowed twice, but owing to its tendency to drift stubble fallow on the light sandy soil should only be once harrowed. The implement should be put over fallow that had been cultivated after each fall of rain. After the drill also harrowing should not be neglected. He preferred the stump-jump implement, with a blunt tine, to the set harrow. A good discussion followed the reading of the paper.

### MINTARO.

July 15th.—Present: 28 members.

Sheep on a Small Farm.—To keep sheep successfully on a small farm, urged Mr. H. Schunke, in a paper dealing with that subject, it was essential to erect a good six-wire sheep-proof ring fence, and subdivide it into small paddocks, the fences for which need not be of a permanent nature, but wire netting and stakes would answer very well. On a farm of 500 acres it would pay to keep a few breeding ewes. It would not pay a small farmer to raise lambs for wool, so he should fatten them for market. He recommended large-framed, plain-bodied Merino ewes, with a good fleece of long staple, mated with a Shropshire ram. It was necessary to provide greenfeed for the lambs, and a small paddock sown early with barley would keep them going until the grass came up. In many cases small farmers might find it best to purchase store lambs off the shears, because, in normal seasons, they could be purchased more cheaply than they could be raised. In such a case, it would be necessary to provide a small paddock of feed to keep them going until after harvest, when they might be fattened on the stubble. Stunted or undersized lambs should not be purchased, even if cheaper than the others, because well-grown animals fattened more quickly and were eagerly competed for in the market. A few ration sheep should be kept on every farm. Cull ewes could be picked up cheaply after shearing. He had purchased them at 4s. per head, and at the end of the season got as much as 8s. per skin for them, so that his meat cost him nothing. If there was not water in the paddock for the sheep, it would pay to cart it into the trough for them. Fodder should be grown on the farm for sheep, and he recommended sowing oats, especially on land affected with takeall. He would also grow Grey Dun field peas, which were one of the best fodders for fattening sheep and pigs. Mr. C. D. H. Wright preferred breeding lambs on the farm to buying in the market, because the latter might have received a check. Merinos from good stock were the best for the farm. Mr. D. Kelly said that the present was the best time to breed as many lambs as possible. It paid to feed ewes on hay, but, in wet weather, they wasted a great deal. If domesticated, however, they would soon get over the difficulty. Mr. A. Lowe said that peas could be grown with oats and harvested and fed to the sheep as hay or chaff.

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## NORTH BOOBOROWIE (Average annual rainfall, 16.35in.).

September 15th.—Present: 13 members and 33 visitors.

Castration of Boar Pigs.—Young boars should be castrated when four weeks old, remarked Mr. J. W. Smart, in a paper on that subject. All that was required was a keen-edged knife and some kerosene to rub on the wound after the operation. With boars nine months old and upwards operators who did not possess an emasculator should tie the string with some threads of silk before removing the testicles, in order to prevent bleeding. When operating on large boars in late spring or early summer it was necessary to apply Stockholm tar, or some substance to keep the flies away. It was inadvisable to allow any pigs other than the mother to lie or sleep with the young ones, which were frequently crushed or ruptured in consequence, causing serious difficulties in castration.

Castration of Bull Calves.—Bull calves should be castrated when young, even when only a few days old, asserted Mr. E. J. Dunstan, in a paper dealing with that subject, because then they would recover with less check to their growth. If left until several months old the calf should be tied by the neck to a firm post. The hind legs should be fastened together and tied to another post. That was all the tying up necessary. If the beast were full grown, an easy method of throwing it was to make fast the head to a post and then tie a longer rope to the one around the neck and put two half hitches, one behind the front legs and one in front of the hind legs. By gently straining on the long end of the rope the beast would go down steadily. The legs should then be tied as before mentioned. A sharp clean knife should be used, and a large cut should be made in the purse rather than a small one, in order to allow the inner wound to heal and discharge before the outside one had healed. A fair amount of olive oil should be poured into the purse after the operation, and the oil should also be rubbed on the outside to keep it soft and prevent the flies from attacking it.

Lamb Tailing.—In a paper on lamb tailing Mr. W. E. Hannaford recommended that the ewes and lambs should be yarded as quietly as possible, and be allowed to remain in the receiving yards for half an hour to cool down. Some of the lambs should then be run into the catching pen. The assistant should catch the lamb and lift it gently on to the marking bench or rail, place it with its back to his chest, grip the hind legs, and hold them securely between the lamb's front legs. The operator should then earmark the lamb, cut the tip off the purse, and with the thumb and first finger of each hand press the skin of the purse down until the testicles could be gripped with the teeth. They were then easily drawn out. The tail was then removed, and the assistant should slowly turn the lamb in such a way that it would fall gently on to its feet, and then it should be released. When possible the lambs should be left in a paddock adjoining the yards for a few days.

Mr. F. E. Place, the Government Veterinary Lecturer, gave a veterinary demonstration before the meeting, and subsequently delivered an address on the castration of horses.

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## WIRRABARA (Average annual rainfall, 18.91in.).

August 12th.—Present: 23 members.

Prevention of Sore Shoulders.—In a paper dealing with sore shoulders in horses Mr. J. A. Jaehschke said that the trouble was caused in four ways, viz., by ill-fitting collars, by too high or too low hames, by wet shoulders, and by the manner of feeding. The collar should always fit well on the shoulder, and should be a pipe collar in order that a horse might not "choke down." The lining should never be cut to pull out hair. When the horse shows signs of developing sores, the hair of the collar should be worked towards the inside with a bag needle, if no proper instrument be at hand. The hames should fit exactly on the collar. If the horse shows a tendency to develop sores very high up on the shoulder then the hook was too high. It was the duty of the man who worked the horse to have the hames set right. Working in showery weather had a bad effect on the shoulders. As regards feeding, if crushed grain were given, one particular class of grain should be decided upon and adhered to, because a sudden change of feed seemed to affect the shoulders. Boils on the shoulders were the result of impure blood, and could be remedied by the administration of a dessertspoonful of sulphur once a week. There were some horses which, in spite of all precautions, developed sore shoulders. Animals of that sort should be worked with a breastplate, although it was not as comfortable to work in as a collar. It was inadvisable to allow hardworking horses to have soft young green feed; it was better to wait until the feed had developed some strength.

## YACKA.

August 9th.—Present: 14 members.

Wheat Improvement.—Since the cost of wheat production was increasing and the system of cultivation appeared to have reached a standard which did not permit very large increases in that direction, in future other sources would have to be looked to in order to increase the returns per acre, observed Mr. A. O. Badman in a paper on wheat improvement. That could be accomplished in three or four ways; firstly, by selection; secondly, by cross fertilisation; thirdly, by grading seed; and fourthly, by variety testing. He would confine his remarks to (1) selection, and (2) variety testing. In the first case, each farmer should attempt to select the best varieties and then try new varieties. If they were found wanting a careful selection should be made of the older ones. When the wheat was ripe it should be gone through and some of the best heads picked, paying due attention to the conditions under which the plant had been grown. The best heads should be taken from the best part of the crop, and not from watercourses or isolated plants. In that way about 2lbs. of grain should be gathered, and it should be sown in a small plot at seeding time. At harvest time another 2lbs. of wheat should be selected from the original selection crop, and that, with the seed from the small plot, would yield sufficient to sow an acre. From that area sufficient seed would be gathered to sow 25 or 30 acres, which should provide enough seed in an average season to sow an average-sized farm. By that system, which he commenced five years ago with Federation wheat, he reaped in the third year 21bush. from the "selection" seed, where that not selected yielded only 18bush. per acre. Another system by which the yield might be improved was by ascertaining the variety best suited to the soil in which it was to be sown. He did not recommend paying a high price for wheat which had given phenomenal results elsewhere. Wheat which has done well in one place might not do well in another. He had inaugurated a system of variety testing to ascertain which varieties were best suited to the local conditions in regard to yield of hay and grain. If any variety gave evidence of heavy yielding capacities a larger area would be sown with it the following year to prove its worth. Last year he had experimented with 100 varieties, but owing to the systematic manner in which he proceeded, the extra work was infinitesimal compared with the value of the results obtained. His experiments embraced seed from New Zealand, India, Russia, South Africa, and Canada. Some were too early and others altogether too late, notably Bordier, Alberta Red, Clansin, and Beardless Odessa. When testing due regard should be paid to the different quality of growth apart from the yield obtained, and it was necessary also to mark any outstanding features of superiority or deficiency. Its tillering proclivities and its resistance to drought and disease, such as rust, smut, &c., should also be noted, nor should its value for hay or for milling be overlooked. Not more than ½lb. of seed was sown in any plot, and in some cases as much as 24lbs. was reaped. He sowed 60lbs. of seed and 70lbs. of superphosphate to the acre. For check plots Federation, Marshall's No. 3, Yandilla King, and Gluyas were used, and gave respectively the following yields per acre:—37bush. 29lbs., 30bush. 24lbs., 26bush. 36lbs., and 28bush. 4lbs. In searching for rust-resisting varieties he found that the following were least affected on the flag and straw:—Joffre, Major, Canberra, Prolific, Unity, Cowra, No. 15, Currawa, Triumph, and American 8. Most other varieties were greatly affected, but not sufficiently to affect the appearance of the grain. In respect of smut-proof or highly smut-resistant wheats he believed that they were entering upon a new era. The late Mr. W. Farrar left three varieties which were almost entirely smut proof, namely, Genoa, Florence, and Cedar. He had grown Florence and Cedar for four successive seasons without pickling the seed, and had not found a trace of smut amongst them. They were both good milling wheats, Cedar winning the championship at the Sydney show. It was a good yielder, but tough to thrash, and Florence had a tendency to shed its grain. Other more recent introductions of the smut-resisting class were Bomen, Nardoo, and American S.P. Of wheats for hay the best in appearance were Warden (late), Zealand (late), Firbank (early), J. No. 4 (early, which was green in the straw right to the base, even after the grain was well developed), Correll's No. 7, and New Zealand Blue. According to the results obtained with the plot system the most promising varieties were Joffre, Dookie Crossbred, Major, Caliph, Marshall's Unity, Marshall's Prolific, Canberra, American 8, and Nardoo.

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BEAUFORT, August 10th.—Extracts were read from *The Journal of Agriculture* on takeall, and discussion ensued. Mr. Mugford said that deep ploughing and leaving the ground too loose promoted takeall. The secret of success was early fallow. Mr. J. Simpson said that late fallow induced takeall. Mr. Zard said that takeall had diminished since the introduction of superphosphates. Land properly fallowed and sown would not be troubled with takeall.

MUNDOORA, June 19th.—A paper on sore shoulders in horses and their causes was read by Mr. H. Bates, and provoked considerable discussion. The opinion was expressed that too much corn and insufficient bran or cooling food were responsible for sore shoulders, as well as overwork.

PORT GERMEIN, August 19th.—A paper on the treatment of heifer calves was read by Mr. P. Blesing, who contended that the future of a cow depended upon her treatment in her earlier days. When calves were not properly fed, their digestive organs were dwarfed and stunted and, later on, when required to take large quantities of feed and convert it into milk they failed, because they had not been developed on proper lines. Calves should be given plenty of outdoor exercise and plenty of water. As soon as they were old enough to nibble they should be put in good pasture. Shelter should be provided for them at night and against inclement weather. The freshening period was a very critical one, and the heifers should be cared for and broken in by an experienced attendant, who should be a good, quick, easy and thorough milker, and one who should get the affection and confidence of the cow.

PORT PIRIE, July 15th.—Mr. W. E. Martin read a paper on the care of farm stock, in which he urged the necessity for providing plenty of fodder for them. He particularly emphasised the necessity for a straw stack, which afforded warmth and shelter and a modicum of feed. Horses should not be overworked, and, with ordinary care, they would still be useful when 15 years of age. In the course of discussion, Mr. J. Greig advocated the necessity for good stabling, and, where high winds prevailed, that the stables should be enclosed on three sides.

WHYTE-YARCOWIE, August 19th.—Mr. G. McGregor read a paper on departmental aid in breeding sheep, in which he advocated the sending out of experts by the Government to advise the farmer as to the best ewes to utilise for breeding, and the class of rams with which they should be mated. He also suggested that the Government should breed rams for sale at reasonable prices or for hire. Every effort should be made to improve the class of wool produced. Mr. G. F. Jenkins suggested lectures and demonstrations in sheep breeding should be given by experts in the various districts. Mr. E. J. Pearce said that greater care should be exercised in the selection of rams for use on farms.

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## LOWER-NORTH DISTRICT.

### (ADELAIDE TO FARRELL'S FLAT.)

### ANGASTON (Average annual rainfall, 22.25in.).

August 12th.—Present: 16 members and one visitor.

**Grafting and Budding.**—Grafting was not necessary, except when it was desired to place a different variety of the same species on its own stock, said Mr. S. O. Smith, in a paper on grafting and budding. For instance, he said, the quince and cherry plum rooted readily from cuttings. The former might then be used as a stock for some varieties of pears, loquats, or different varieties of quince. Cherry plum and others of the Japanese varieties might be used for all kinds of plums and prunes. Many fruits, such as apricot, peach, plum, pear, apple, cherry, etc., would not strike readily from cuttings, but, given seedlings or roots of these trees, an unlimited quantity of any varieties of them could be produced by grafting and budding. Budding was done in the summer, and might be practised as long as the sap was "running," that was, whilst the bark lifted easily from the wood. If the bark required to be opened forcibly, there was very little prospect of the bud "taking"; it would simply die of starvation. If there were any doubt as to the sap conditions, the young tips of the tree should be looked at, and if they were young and vigorous, with tender growth, the probability was that a bud could be put into the old wood, that was wood several years old. In any case, if a T cut were made and the blade of the knife, or better still, the reverse end of the budding knife inserted, and it was found that the bark lifted freely without tearing, and was juicy, the bud should be successful. In choosing the "wood" or "stick," the best and most consistent bearing should be taken and not water shoots, but preferably from the end of the boughs. The bud should not be cut out too deeply or there would be too much wood under the bud, and it would not then conform to the shape of the branch into which it was to be placed. It was a mistake to strip off the small chip of wood, because it endangered the vitality of the bud. The safer method was to raise the knife slightly when just under the bud, thus considerably reducing the thickness of wood left. In the stock or limb to be budded a T-shaped cut should be made, the bark lifted away, and the bud inserted. It should be pushed down until well covered, and should be then tied with strong bonnet cotton. After a week or 10 days the leaf stem should be touched, and, if the bud had "taken," the stem would fall off. At the end of the season, when the sap flow was falling off, the string might be left on for some time; but, early in the season, when the sap was in full flow, the string should be taken off, when the leaf stem had fallen, and the branch might be cut off immediately above the bud. Grafting should be done in late winter or spring. For small limbs or trees, about the thickness of a finger or a pencil "tongue" or "whip" method was generally used; for thicker wood, the cleft or split; and for large limbs or butts, the "crown" graft. In the "whip" graft both scion and stock or limb should be about the same size, with a sloping cut about an inch in length, and a nick cut in both. When pushed one into the other the nicks tended to hold the scion and stock in place whilst being tied. Tying might be done as for budding, and, if above ground, waxed strips should be wrapped around to exclude the air. In cleft grafting, the stock or limb was split and the scion cut wedge-shape to fit. The split should be opened with a wedge and the scion inserted so that the bark of the latter met the inner bark of the stock. The wedge was pulled out and a waxed bandage put round the graft, when completed, to exclude the air. "Crown" grafting was much preferable to the cleft, because the latter afforded a harbor for vermin, and dry rot was more likely to follow. The tree should be cut off and the bark opened or eased from the trunk with a knife blade. A scion, cut on one side with a long slicing cut, should be pushed or hammered in. A small shoe nail should then be driven through the bark and scion in order to fix it securely. A strip of grafting cloth should be wound around to exclude the air. In large trunks a dozen or more grafts might be placed, and if all or most of them should "take," those most suitably situated might be selected and the remainder pulled out. In place of waxed cloth, grafting wax composed of 4ozs. resin, 2ozs. beeswax, and 1½ozs. beef or mutton suet might be used, but it was a messy job and not so economical in wax.

## LONE PINE.

September 12th.—Present: 16 members and 11 visitors.

Pig Raising.—The pigsty, remarked Mr. J. A. Buttfield, in a paper on pig raising, should be large and divided into two portions, one open to admit sunlight and the other covered for protection against the weather. The floor should be sloped, in order to facilitate drainage. Under no circumstances should pigs be permitted to stand in the wet. Straw should be provided as bedding in the covered portion, and the sty should be cleaned every week. Cleanliness, warmth, pure air, sunlight, good drainage, a variation in food, warm and cold, dry, moist, and green, were essentials in successful pig raising. The Berkshire was the most suitable all round pig, and the sow should be larger than the boar, which should be selected from a breed well suited to the market, and should be sound, well shaped, and free from hereditary blemishes. A sow should have 12 teats, and should be 12 months old before she had her first litter. She should produce two litters per year. Inbreeding should be avoided, because the pigs became smaller and the sows almost barren. Sows should have a sufficiency of food, but never allowed to become fat. Litters should arrive in March and September, or earlier in the year if possible. In feeding for pork young pigs should be given skimmed milk, with barley added. Green feed quickened the appetite. Highly bred pigs kept growing from birth might be made porkers at sixteen weeks. For the pork market a pig should weigh about 100lbs. in the carcass, and for the bacon curer the weight should be 120 to 140lbs. Mr. A. J. Fromm, in reply to a question, said that the most suitable pig for the market was the Berkshire-Essex cross, well fattened. Mr. G. Hoffmann preferred the Berkshire-Yorkshire cross. Pigs for market should be fed on dry wheat for the last four weeks. Mr. A. Weckert said that pigs should be castrated at the age of six weeks and left with the sow for two weeks after the operation.

## NORTHFIELD (Average annual rainfall, 19in.).

July 11th.—Present: six members.

Farm Buildings.—A well drained site, easily accessible for a loaded wagon or storage of implements, was the first essential in laying out farm buildings, declared Mr. E. W. Kelley in a paper on that subject, and he added that provision should be made for future extensions if necessary. Concrete or stone walls were most serviceable, and when gravel and sand were easily procurable would probably prove cheaper than iron at the present time. The stable and chaffhouse should be under one roof, with the stable opening towards the north to admit the free entrance of sunlight, which kept the interior sweet and wholesome. Sliding doors might be provided, to be closed on rough nights, but generally they might be left open. The hay and chaff shed should be at the back, with a passage way to feed from the front of the manger. In that way the labor of feeding would be less than with two buildings separate, besides saving material in construction. A roomy loose box should be provided, enclosed with a good strong yard, which would prove very useful for isolating sick horses or weaning foals. No set plan could be laid down for the implement shed, barn, &c., as each farmer would build according to his own conception of his particular requirements. Generally a building, 50ft. x 20ft., with room in the centre to drive a wagon load of wheat or super. under cover would be found convenient. A raised platform level with the floor of the wagon could be erected at one side of the store for the purpose of storing seed wheat and manure, whilst the other side could be used for the binder, drill, and other implements. A floor space, 20ft. x 15ft., provided with sliding doors, could be mouse and poultry proof. The remainder of the building could be left with open sides. Milking sheds should be paved, and where water was available from a main, provision should be made for flushing it daily. If a number of cows were kept, a separator room should be provided near the milking shed. Pigsties and calf pens should be situated on a well-drained site, a short distance from the milking shed, but all such buildings should be well away from the stables. Mr. J. Williams preferred the stable opening to the east. Mr. D. Rowe favored having the stables and implement shed under one roof. Mr. Dall would like to see an arrangement by which, say, a dozen horses could be placed head to head, with a passage way between the mangers. Stalls should be strong and roomy. He preferred the eastern opening for the stable, and the engine should be housed in a shed of its own, outside the chaffhouse. Provision should also be made for poultry with yards and shelter sheds.

## NORTHFIELD (Average annual rainfall, 19in.).

August 2nd.—Present: eight members.

The Farmer and the Bureau.—In a paper dealing with the work of the Agricultural Bureau Mr. A. Sandercock suggested not only that farmers should induce their sons and the workers on the farm to become members of the Bureau, but that the Bureau would be bettered and strengthened if the farmers' wives and daughters were admitted. The outing would do them good, and they would benefit socially, physically, and mentally. It was the wives and daughters who attended to the milking, butter making, the poultry, and the pigs. He had known cases in which the women exceeded the men in their knowledge of those matters, and in the treatment of cow and poultry ailments. He concluded by contending that wheat, sheep, cattle, cow, pig, and poultry farmers, and also gardeners, their wives, their sons, their daughters and their men servants should become members of the Bureau, because by that means they could get help and give help from their fellow laymen by intercourse, by questioning, by the reading of papers and addresses, by experiments, by practical demonstrations, by homestead meetings, and by social evenings. Mr. F. Chardon said that the suggestion in regard to wives and daughters becoming members of the Bureau was a novel one, but well worthy of consideration. Mr. A. Berg said that the ladies would be better at home. Mr. W. J. Dall favored the formation of Ladies' Branches.

SALISBURY, August 1st.—Mr. A. Hooper read a paper, in the course of which he described many shortcomings in the conduct of farms and made suggestions for the improvement of farming methods. He referred to the necessity for abundant shed accommodation, expressing a preference for the T-head structure. Careful attention to such matters as fencing, harness, and vehicles was urged, and surprise expressed at the little attention given to crop rotation. Such crops as peas, oats, barley, and rye might well be included in their practice, he said, and catch crops—sorghum, maize, vetches, rape, &c.—for feeding to cows and sheep, were too frequently neglected. He strongly impressed on members the wisdom of taking vigorous steps to suppress noxious weeds, in particular Paterson's curse, star thistles, and Cape tulip. In regard to livestock, the sheep to the acre was the ideal they should have in mind. Hay stacks could not be disposed of to better advantage than by being fed to that class of stock. That feed could be supplemented by lucerne, barley, rye, rape, and mustard, which would be found to provide fodder the whole year round. The most desirable class of sheep was the Lincoln-Merino cross; for fat lamb production the best of the first-cross ewes could be mated with the rams of the approved mutton breeds. "A few pounds spent in the first place in getting the best of stock," the paper concluded, "will handsomely repay the purchaser, as only by keeping the best possible can he expect top price for his produce."

## YORKE PENINSULA DISTRICT.

### (TO BUTE.)

### BRENTWOOD..

August 10th.—Present: 15 members and two visitors.

**Sheep and Lambs.**—Largely a reflex of his own practice and experience was the burden of a paper on sheep and lambs by Mr. C. H. Boundy, in which he emphasised first the principle that it was more profitable for farmers to keep ewes for breeding purposes than dry sheep for wool alone. With that end in view it was advisable to buy four-tooth Merino ewes from which good lambs could be bred for four years. The ewes would cost 30s. each off the shears, but, in 12 months each would yield 8lbs. of wool at say 9d., equal 6s., and produce a lamb worth about £1. Thus, in the first year, the ewe would have gone a long way towards paying for herself, whereas with dry sheep it would be necessary to keep a larger number right through the summer to aggregate the same value as the ewes and lambs. He kept about 300 ewes which produced about 225 lambs. If he kept dry sheep it would be necessary to have 500, and the feed and water for the extra 200 during the summer months amounted to a considerable item. On the other hand the lambs arrived when there was plenty of feed about. He worked the proposition out in the following way:—(1) 300 ewes, averaging 8lbs. of wool each at 9d. per lb., equals £90; 75 per cent. lambs, 225 at £1 each, equals £225; total, £315. (2) 500 dry sheep, average 10lbs. of wool at 9d., equals £187 10s., showing a balance in favor of ewes of £127 10s. For breeding purposes he preferred Merino ewes, which were the most prolific breeders, were well suited to the climate, good mothers, and very quiet. It was most profitable to cross for mutton and export lambs, which were usually well framed animals, and if left on the producers' hands would yield good wool, and reach maturity quickly. For a first cross he favored the Lincoln ram and the Merino ewe, but if a further cross were desired the crossbred ewes should be mated with Merino rams, which would produce an excellent comeback with good wool and carcass. About the middle of November he put the rams with the ewes, and the lambs were dropped in April and May. About the end of January he removed the rams, because lambs dropped after the end of June would not mature for market before summer. It was inexpedient to run the rams with the ewes all the year round, because then provision required to be made for summer lambs. That meant keeping a smaller number of ewes or providing an extra paddock, thereby probably interfering with the stubble land being kept for the next year's spring lambs. In mating as he suggested, the lambs would be ready for market in two drafts, the first in the middle of October, and the second the first week in November. The ewes could then be turned on the fallow, and the rams put with them about the middle of November. The ewes would not be too fat for breeding purposes. He preferred to use two rams for every 100 ewes, or, say, seven rams for 300. If plenty of rams were available more should be used, but not less than the number mentioned, as it was advisable that the lambs should be dropped together, in order that they could be treated in two tailings. Lambs should not be too big before being tailed. In selecting a ram it was profitable to purchase a well-bred one. He preferred a low-set square-framed animal with wool curly and fine. He recommended sowing Cape barley for the ewes on small holdings, because it increased the stock-carrying capacity of the farm. It was also payable to feed sheep after the first rains on chaffed hay or on oats when cheap. Mr. J. J. Honner said that lambs dropped at the end of July last year, although not worth shearing at shearing time, had been sold in March for 24s. each. During the drought he had 150 wethers for which he had paid 35s. per head, and he could not fatten them sufficiently for the market. Their fleeces yielded approximately 10s. each, and he found that he could only get about 10s. each for the wethers. He fed them on chaffed hay at £4 per ton, and they fattened on 2lbs. per day per sheep. When the stubble was ready he turned them into it and sold them in the following April. After deducting the cost of the hay and the original price of the sheep he cleared £100 on the transaction. Farmers with a chaffing plant could make a profit on the hand feeding of sheep, with hay at £3 per ton. For lambing ewes hand feeding was not conducive to milk production, and the lambs missed the green pickings, but the ewes put on splendid condition, and he had no losses when they were turned out. Mr. J. Boundy said that he had known lambs dropped in July which did just as well as those born in May, because the later lambs received no check. Mr. H. L. Martin said that his practice was to keep the rams with the ewes until all the ewes were in lamb.

MINLATON, August 11th.—Mr. J. McKenzie read a paper on the application of mechanical science to agriculture. After a review of the revolution which mechanical inventions had worked in farming operations, he concluded by expressing the opinion that the model farm of the future would, when electricity took its place in the progress of mechanical science, be provided with a power house instead of a stable: Discussion followed in which the methods of 40 years ago were contrasted with those of to-day.

## WESTERN DISTRICT.

### CUMMINS.

August 12th.—Present: seven members and three visitors.

FALLOWING.—After setting out the better returns derived from fallowed land, Mr. G. H. Potter, in a paper dealing with that operation, remarked that if land should be pestered with weeds fallowing should be continued and the working of it should be left until shortly before drilling; then it should be done lightly and just sufficiently to make a good seed bed. He was averse to deep fallowing, particularly on new land, but the ploughing should be thorough, and every inch of land turned.

Manures and Manuring.—The best way to treat a soil, said Mr. Konrad W. M. Beisel, in a paper on manures and manuring, was to work it judiciously and manure it suitably. It was a fallacy to believe that tillage would replace fertilisers or that fertilisers would replace tillage, because the two required to go hand in hand. Tillage was not a substitute for, but an attribute to manuring. Plants required 10 chemical elements for their perfect well being. Manures were divided into two sections, organic and inorganic, the first embracing animal and vegetable substances, which contained an appreciable quantity of nitrogen, and the latter composed of purely mineral substances, which, in general, contained no nitrogen. As regarded the organic manures, farmyard and green manures supplied the soil with the complement of plant food, and they greatly improved the physical condition of the soil. Therefore, one of the most valuable substances a farmer could introduce into his soil was organic matter, because the productive capacity of a soil largely depended thereon. A necessary consequence of that conclusion was the greater use of yard manure, and the growth of pea, rape, rye, or mustard crops—some of the soundest factors in successful agriculture. Every farmer naturally desired more yard manures than he was able to procure. However, what he did get he should not stack in front of stables to waste or to lose its necessary effect; but he should apply it over different areas of soil each successive year, and reinforce it with fertiliser. The best and most practical method by which a farmer could ascertain the deficiencies in his soil requirements was by experimenting systematically. He would observe the effect of different fertilisers on his crops, and, gradually learning the peculiar need of his soil, would fertilise accordingly. In many cases it was sufficient to merely test different fertilisers as a part of the regular farm practice; in other cases it would pay to lay out fertiliser plots. A common method of testing fertilisers was to use different kinds indiscriminately until one was found that answered the purpose. That was usually an unsatisfactory method. Another way was to apply each of the three plant foods separately, and in combination. That was an exact and reliable method. The farmer might have a crop the stalks of which were puny and short, the color inclined to be of a yellow tint, and the ears might be small, but somewhat larger than the size the stalk would appear able to grow. What was deficient in that kind of soil? Nitrogen promoted growth and gave a rich, dark, healthy color to the foliage. If then the crop was puny and short, and of light color, it was safe to say that the soil needed nitrogen. If the ears were set and filled well, in proportion to the size of the stalk, there was enough potash; but if the stalk did not shoot and did not fill properly, the soil needed potash also. If the grain was slow in coming to maturity, then the soil required phosphoric acid. Many farmers might be tempted to apply raw, ground phosphate, by reason of its cheapness; but such manures should be consistently avoided. Under the peculiar soil and climatic conditions which exist in South Australia there was little hope of the insoluble phosphate ever becoming available for the use of the crop. It was of the greatest importance to use superphosphate, in fact it had been conclusively demonstrated again and again in departmental experiments that super. was indispensable to successful farming. A great deal of confusion existed as to the rate of application. Generally speaking, the drier the district the smaller the application. In the Loxton district as little as 30lbs. to 40lbs. was used, while in a comparatively moist district 2cwts. could be used with impunity. The indirect effect of heavy dressings on the resultant pasture should always be remembered. By consistently heavy dressings of superphosphates pastures had been improved beyond recognition. However, the rate of application under any given circumstances could best be determined by actual experiment. In purchasing a manure the producer should always insist on getting the guaranteed chemical analysis, and in choosing a manure should use discrimination, judgment, and observation. Experimenting was the keynote to successful agriculture.

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## GOODE (Average annual rainfall, 12in. to 13in.).

August 9th.—Present: 11 members.

Fallowing.—As soon as seeding has been finished fallowing should be commenced, declared Mr. Wm. Tainsh, in a paper on that subject. The horses, he continued, were then hard in flesh, and the ground soft, enabling the plough to do good work. The ground should be ploughed at least 4in. deep, which was 1½in.

deeper than usual, to ensure the breaking up of the crust, which formed about 3in. below the surface. The fallowing might go on until the grass was in seed. The early fallow would probably require treatment later on with a scarifier or cultivating plough to kill weeds. A flock of sheep would answer the same purpose. Land which had a tendency to drift should be fallowed first to solidify it, and land that was prone to become cemented should be cross cultivated and harrowed after rain.

In a paper dealing with the same subject Mr. W. G. Morcombe said that the land after cultivation for a period became so dirty that it was practically impossible to grow wheat on it without fallow. The period between seeding and harvest could be profitably devoted to fallowing, because the horses would otherwise be idle. Three inches was sufficiently deep to fallow light mallee soil, and it was no advantage to plough any deeper owing to the difficulty in consolidating the lower portion into a good seed bed. He preferred a share implement, which would cut cleanly to destroy weeds without going deeper than 1½in., and would at the same time leave the soil ridged, which was a hindrance to drift. Harrowing after heavy rains would be found profitable, because it would break the crust and preserve moisture. If sheep could be turned on the fallow weeds would be prevented from seeding and the ground would be fertilised—a double advantage. Mr. W. Folland said that if the land were turned up roughly drifting would be steadied and the air and sun would improve the soil. When the fallow needed cultivation to destroy weeds he preferred to use a tine cultivator instead of a disc. Where there was a liability to drift a bag wrapped around alternate standards would cause ridges and impede the drift. Fallow should not be sown before rain fell, and should be lightly cultivated to destroy the first crop of weeds. The practice of trying to cover too much land with the plough was condemned, and a narrower cut, which would completely turn the sod, was recommended.

### GREEN PATCH (Average annual rainfall, 26.56in.).

September 11th.—Present: nine members.

Care of Hay and Stack Building.—It was beyond doubt, affirmed Mr. C. Venning in a paper dealing with the care of hay and stack building, that the best method of storing hay for use was to put it under an iron cover. That paper, however, was for the benefit of those who adhered to the system of open stacks and thatching. A well drained dry position should be selected, and it was essential that the bed should be laid lengthwise north and south, in order that the sun might shine on both sides and dry the hay equally. A good hay bed of logs should be provided to keep the stack about 1ft. off the ground. In putting the first layer of sheaves down the ringers should be bound with the heads of the consecutive layers in to the middle. After that it was better to bind with the butts of sheaves, because it was easier to build. The middle should be kept well up, in order to allow the stack to spread a little as it settled down. Before putting on the roof, a ring layer of sheaves should be placed, projecting about 6in. all round, forming what was called the eaves. A load of nicely tied long sheaves should be kept back for that purpose, in order that they might be firmly held in the stack. Before roofing an extra high layer should be built in the middle, and it should be fairly steep in order that, as the sheaves were laid on the roof layer by layer, they would be all sloping outwards, an arrangement which caused rain falling upon the stack to run away from outside sheaf to sheaf until it dropped over the eaves clear of the stack. Thatching grass, grubbed up in large cakes, and placed on the roof, made a waterproof cover, and was far superior to straw. It was only in that district that the thatching grass grew. In the middle parts of the State straw roofs were sufficient to keep the rain out, and in the North no covering was required beyond building a steep roof.

### MILTALIE (average annual rainfall, 14.55in.).

August 11th.—Present: 11 members and two visitors.

Advantages of Fallowing.—The first essential to fallowing, observed Mr. W. E. Hier, in a paper discussing the advantages of that operation, was to have the paddock ready and fit for fallowing—that was, that the land should be cleared of straw or shoots. Straw, if ploughed in, had a tendency to encourage takeall. It was not good policy to plough in mallee or other bushes. He would use a five or six-furrow plough, not too light, or the land would soon grow hard. He would work the ground, which had been well ploughed, in lands two chains wide, with a cultivator. Ground which had been ploughed in lands could be cross-harrowed, which was a great help to stimulate the growth of weeds, which could be finished with in the springtime. If the weeds were allowed to seed, much of the advantage of fallowing would be lost. Fallowing economised horse strength, because well worked fallow did not require deep working at seeding. Fallow should be worked in rotation, viz., fallow, wheat, and oats, if liable to takeall, but if not, another crop of wheat might be taken. To derive the greatest benefit from fallow, sheep should be kept, because they were of great assistance in preventing weeds from seeding, besides making good use of feed which would otherwise be wasted. He had noticed that small paddocks were the best worked, and, as a rule, produced the best crops. At all events, 200 acres well worked would do better than 300 acres only partially treated. Mr. W. G. Smith favoured ploughing an extra depth every few years. Mr. J. P. Story pointed out that it was not always possible to cut mallee shoots and have them raked off and burned before fallowing. He preferred the rotation—wheat, oats, feed, and fallow. Mr. P. J. McEachen advised the use of the roller, as well as the harrows. Mr. L. Aunger did not agree with the statement that 200 acres thoroughly fallowed were better than 300 acres only partially treated, because the produce of the extra 100 acres, even with a lighter crop, would require a lot of making up on the 200 acres. However, very much depended on the size and nature of the farms. Mr. J. S. Jacobs related that in his experience the rotation of wheat, oats, and feed and fallow was the only way to provide against takeall.

BUTLER, July 24th.—After the annual meeting Mr. C. F. Jericho initiated discussion on late seeding. The consensus of opinion was that seeding should be over by the middle of June. In the present season late sowing was unavoidable owing to the weather conditions. Sowing on fallow when dry was conducive to the growth of weeds. Though some good results had been obtained from late sowing the practice should be avoided. In answer to a question Mr. C. F. Jericho said that the best method of treating leakage in an underground tank in which the water had dropped 3ft., was to pump out all the water at once, cut out cracks, and stop with cement. If the water were not pumped out the swelling of the surrounding clay from the leakage of water might tend to push the walls of the tank inwards.

CARROW, August 10th.—Mr. F. Burt read a paper on stimulating interest in Bureau work. Discussion followed in which the views expressed in the paper were commended, and it was urged that members should visit each other's farms, and that the best kept and best managed should receive a prize.

COORABIE, August 12th.—Mr. E. J. Stretton read a paper suggesting the establishment of boys' clubs on the lines of the boys' corn clubs in Minnesota, U.S.A., in which prizes were offered for the best results from acre plots entirely tilled and harvested by boys. After discussing the matter, it was resolved that members should interview likely lads and ascertain whether such a project as suggested would be welcome.

GREEN PATCH, August 14th.—Members discussed various questions which were raised. Members stated that yacca land, after producing a good wheat crop for a couple of seasons, would not produce a profitable crop afterwards, whether given a spell or not. The general opinion was that oats should be grown for a number of years before wheat was tried again. Mr. F. Gore, a practical gardener, in answer to questions, said that to ensure a profitable return from growing rhubarb the ground should be worked thoroughly and manured well. It was not usual to take out rhubarb plants in the winter for storage. Rhubarb plants required removing in periods which varied from four to seven years, and should be planted 2in. under the surface in rows. He suggested that children should be taught to tend the farm garden. He expressed the opinion that it was not wise to plant sugar gums near the orchard, because they absorbed considerable moisture from the soil and were a great harbor for birds, because they blossomed just when the fruit was forming.

KOONIBBA, June 15th.—A paper on wet and dry sowing was read by Mr. A. Moody. Considerable discussion ensued, the trend of which was against dry sowing. Wheat sown after the rain rarely came to any good.

KOPPIO, August 8th.—Mr. Thos. R. Gardner read a paper on stimulating interest in Bureau work, and the members who discussed the paper endorsed the views expressed. Mr. R. T. Richardson read a paper on the bulk handling of wheat, which caused considerable debate.

MOUNT HOPE, August 18th.—Mr. G. A. Vigar read a paper on dairying, in which he declared a preference for a milking strain of Shorthorns. He found barley the best green feed, which the cows would eat in preference to any other. He advocated securing the best cows possible, and giving them as much feed as they would eat every day. They should be treated kindly and milked regularly. The milk should be separated every day, and butter made twice a week. All utensils should be kept perfectly clean, and it would be found that the cow was about the best side line on the farm. In the discussion which followed members generally agred with the views expressed in the paper.

SALT CREEK, August 12th.—A short paper, entitled "A small blacksmith's shop," was read by Mr. W. Gale, in which he set out the many savings in the way of repairs which could be made by a farmer who had a small blacksmith's shop on the farm. He recommended the following articles:—Anvil, 30s.; bellows, 60s.; drilling machine, 35s.; vice, 30s.; taps and dies, 30s.; hammers and tongs, 10s.; total, £9 15s. Mr. A. Venning said that his blacksmith's shop saved him £50 per annum. Mr. G. Barber recommended the purchase of a blower instead of bellows.

SALT CREEK, September 9th.—Mr. H. G. Hornhardt read a paper on mixed farming, in which he advocated the breeding of horses and cows. He also said that no farm should have less than 100 sheep, and that it should have as many more as it could carry. Pigs should also be kept, but not in too large numbers. Mr. W. Gale said that he had not had much success in breeding horses and cattle. Mr. Lee, sen., thought it more profitable to rear cattle than light horses. Mr. A. Venning said that the general opinion was that horses would be dear after the war, and a commencement should be made now to breed animals of the right stamp. It paid to breed cattle at present prices. He preferred poultry to pigs. Every farmer should keep a few sheep, but should avoid overstocking.

YEELANNA, August 12th.—A paper on co-operation among farmers was read by Mr. W. Watkins, in which the advantages to be derived from adhering to the principle was outlined. Considerable discussion followed, in which the views of the writer were endorsed.

## EASTERN DISTRICT.

### (EAST OF MOUNT LOFTY RANGES.)

### CLANFIELD (Average annual rainfall, 16in. to 17in.).

July 15th.—Present: 11 members and three visitors.

**Preparation for and Selection of Sheep.**—As the majority of farms in that district were not yet securely fenced or laid out in permanent paddocks, the opportunity should be taken of making a plan of the subdivision which would provide the best water supply with the minimum cost of fencing, observed Mr. A. H. Wilkins in a paper dealing with the preparation for and the selection of sheep for that district. No definite plan, he said, could be laid down, because the position of the homestead and the water supply required to be considered in each instance. All farmers could not have their dividing and subdividing fences sheep-proofed in the one season, but the larger paddocks could be laid out so that when the subdivisions were made, the water supply would be accessible to every paddock. Though sheep could be accustomed to doing with little water, it was not a wise policy, least of all in the dry months of the year, and much better results were obtained if the sheep could get water just when they felt inclined. The class of fence to be erected depended upon the breed of sheep to be kept. British breeds were all more or less rogues, and transmitted that failing to their progeny.

In any case the fence should not consist of less than six wires with the first wire 5in. from the ground, and the others 5, 5, 6, 7, and 10 inches respectively apart, which would give a fence 3ft. 2in. in height. It would require 11cwt. of No. 10 wire per mile to construct such a fence. Posts or standards should not be more than 11ft. or 12ft. apart. If it were intended to use the flock for clearing up fallow, not troubling about the fat lamb market, and depending on wool for the chief profit, then the pure Merino would be best. For that breed of sheep, well grown, plain-bodied ewes from the Middle North carrying a fleece of 56 or 60 quality should be secured, because it was most used, and excited the keenest competition. A medium sized lock was preferable either to a very small or a very large lock, both of which tended to let dust down on to the skin. The ram should be obtained from a well-known breeder, even if it cost more. It was a grave mistake for those who were not experts to attempt to breed their own rams. Farmers who proposed to cater for the fat lamb market and also desired a fair wool clip should mate Merino ewes with a Leicester ram. That cross would produce profitable hoggets should the season prove unsuitable for raising fat lambs. Those who had faith in the seasons and were prepared to sow the sand ridges with oats or barley for feeding purposes should mate Lincoln cross ewes with Shropshire rams. The product would be a very shapely lamb growing quickly, which would, under favorable conditions, realise when four months' old, a very high price, either in the home or export markets, and should weigh (dressed) from 36lbs. to 40lbs. In mating British breeds of sheep with Merino ewes it was not wise to use maiden ewes, because the broad top of the head of the crossbred produced trouble in lambing. The Leicester and Southdown were least likely to cause difficulty in that way. Under present conditions in that district he favored the pure Merino, but as the land became cleared and acquired a heavier coating of natural grasses, he was inclined to prefer the Leicester-Merino cross. Although the Lincoln cross ewe, mated with a Shropshire ram gave a quick and a very good return, it was very difficult to obtain a good class Lincoln cross ewe. In answer to a question Mr. Wilkins said that he did not like the Dorset Horn because they provided coarse meat, and the ewes had a severe time when lambing.

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### LOXTON (Average annual rainfall, 12in. to 13in.).

August 4th.—Present: 16 members.

**Working the Soil.**—Farmers should fallow from 200 to 400 acres every year, declared Mr. P. A. H. Thiele in a paper on working the soil, and he added that in that district the land should be ploughed early when wet; he preferred the months of June and July, and certainly not later than August. Wet ploughing tended to make good fallow. It was much better to fallow on a clean, bare surface than to attempt to work stubble land or land with rubbish, because dirty ground hindered the work of the cultivator, and might induce the risk of black rust or takeall. In that district ploughing should be to a depth of 4in., and the ground should be harrowed when the weather was dry, to destroy grass and weeds on the fallow, which often rooted in and grew again after wet ploughing. Harrowing also levelled the ground and gave it a clean aspect. If weeds made their appearance the land should be worked crossways with a bridle cultivator. If the weeds were permitted to seed they would probably spoil the fallow for the ensuing sowing. Well worked fallow should give double the yield obtained from grassy, ploughed soil. More land should not be placed under cultivation than could be comfortably coped with. Only the best-known varieties of wheat or the varieties most suitable to the district should be sown. It would be fruitless to comply with all the conditions of soil cultivation unless the strain or varieties of wheat grown could be fully relied upon. In the discussion which followed opinion was divided in regard to the treatment of sandhills, but it was agreed that old land should be well worked and that new land needed only one turning over of the virgin soil before cropping. Mr. G. W. Beverley gave a demonstration of vine and fruit tree pruning in the orchard of Mr. P. A. H. Thiele; this was much appreciated by members.

### MONARTO SOUTH (average annual rainfall, 14in. to 15in.).

August 12th.—Present: 11 members and one visitor.

**Takeall.**—Mr. G. Patterson, in a paper dealing with takeall, said working fallow land dry in the spring time had a tendency to promote the disease. He preferred burning off to ploughing in dry grass, because it made a better seed bed when ploughed subsequently. A rotation of crops, such as oats, barley, and wheat, would help materially to check the disease. In the discussion which followed there was a consensus of opinion that the rotation of crops would prevent takeall, and that three crops of wheat could be grown in succession without danger, for, if the disease appeared in the crops the third year it would be seen only in very small patches.

## MURRAY BRIDGE.

August 14th.—Present: 13 members.

PREPARING FOR AND IRRIGATING SUMMER CROPS ON RECLAIMED AREAS.—Mr. F. W. Lehmann read a paper on the above subject as follows:—"To succeed in getting the very best results off the reclaimed areas on the Murray at the present time, summer crops, and lucerne in particular, take the lead. As lucerne requires an immense quantity of water, ideal conditions should prevail to provide all the water that it requires. It is important that the sluice gates leading from the river should be sufficiently large (not under 2-ft. pipes) to enable rapid and economical watering over large areas while windblows prevail, as very often, at the critical time of the year, with a falling river, the strong windblows are of short duration. One sluice gate should supply sufficient water for two blocks of land of six to seven chains each in width; the position of the gate should be between the blocks, watering to the right and left if land will permit. The first procedure should be the construction of the main supply channel leading away from river sluice gate to the full depth of the block. If the block of land be only six or seven chains in width, it would not be advisable to construct the main channel down the centre, as that would cut the block up into little plots, which would entail a lot of turning with implements; but if blocks be 12 to 14 chains in width, then construct the channel down the centre. There are a number of blocks on the Mobilong Swamps which are only six chains wide, and have the main supply channel down one side. These are ideal blocks to irrigate and to work, whereas other blocks from 12 to 17 chains in width, though ideal blocks to work, are difficult to irrigate. I advise the construction of irrigation channels to lead off the main supply channel at every two and a half chains on frontage lands, and when approaching the salt-infested land to decrease the width to two chains or less. It is desirable to construct the channels before proceeding with the grading. In preparing the soil, the most practical conditions should be followed. That is to say, that if insufficient rains have fallen to well saturate the soil the land should be irrigated a few days before the ploughing is proceeded with, to ensure an even depth of ploughing, and to turn all vegetable matter well under, in order to avoid weeds interfering with the grading. I would not plough less than 6in. in depth. It will depend upon the condition of the soil, and probably upon the weather, when to harrow the land. If ploughing in the summer months, the harrow can follow the plough the same day, whereas in winter the soil may be too wet, and harrowing should only be proceeded with after the land has become dry enough to avoid the soil becoming sloppy. It is not necessary to harrow the land down to a fine tilth at once; it is preferable to allow the land to lie for a week or two at a time, as the effects of the weather will mellow down the soil between the harrowing much more satisfactorily than the harrowing. To obtain the best results on reclaimed land, and to avoid endless trouble and expense, the land should be graded in sections, to enable complete control and rapid methods of irrigation. In constructing the irrigation channels, the soil cast out of the channel and prepared as check banks would hold the water on the particular section being irrigated, and would prevent water encroaching back on plots already irrigated when proceeding with irrigating lower levels. It may not be possible to grade a block of land on an even level from end to end, but check banks can be arranged to divide the higher and lower sections, the sections abutting end to end, along the same irrigation channel. The irrigation channel, when filled the first time, would prove the unevenness of the land, and would indicate where to remove and where to fill in earth, as it is essential to have strong banked irrigation channels. The first watering would indicate where the soil could not be covered with water without deeply inundating lower portions, and, while under irrigation, could be pegged out and measured to ascertain to what depth soil would require to be removed and low spots to be filled in. To obtain a satisfactory grading, the land must be allowed to become dry, and should be fairly loose. As I previously recommended deep ploughing, it would be advisable to again plough the land after grading. The surface soil is the ideal soil for germinating purposes, as it has the constituents necessary for germinating small seed, such as lucerne. The lucerne grain requires a moist, fine layer of rotted vegetation and soil, which will retain moisture and contain the necessary strength to force the plant into a strong growth. Again the deep ploughing will provide the opportunity for the plant to force its tap root down after the receding moisture, and not necessitate a second early irrigation, which is so disastrous to the tender young lucerne plant. The month of September is the most suitable time to sow lucerne, as the mild weather and prevailing rains will ensure a quick growth. Low-lying lands may be sown later, but must be free of salt. The quantity of lucerne seed to be sown per acre greatly depends upon the strength of the soil. A strong, rich deep soil will certainly bear thick sowing, without any die back plants being visible for years. Fifteen pounds of good seed to the acre will provide a fine stand of lucerne; 12lbs. may do so under exceptionally good germinating and favorable weather conditions, but 12lbs. may also fail to provide a satisfactory result if land contains salt. It is essential that the lucerne bed be brought to a fine tilth to avoid seeds trickling down too deeply and to prevent the soil drying out too quickly. Sowing broadcast by an experienced hand has given good results. The sowing should be followed with a light set of harrows. If the soil be nicely levelled down, no rolling need be done, as that helps to pack the soil too firmly, and the result after irrigating will be that large cracks will soon appear when hot weather sets in. Avoid cover crops. Care must be taken in watering a newly-sown lucerne bed, as the water is apt to tear furrows if there be a fall in the land. The greater the number of openings in the irrigation channel the better the watering, as it will then flow evenly over the soil, and avoid tearing the soil away. When irrigating salt-impregnated land it is absolutely necessary to have flowing water over all the land seeded to carry away the injurious salts. Care must be taken not to surround patches, but the water must flow in one direction to the drainage channel and the land quickly drained.'' In reply to questions, Mr. Lehmann stated that wide sluice gates were advisable, so that when a favorable opportunity came the water might be quickly distributed over the land. When the water came on too slowly there was a danger of it soaking away into the drainage channels before irrigating the lucerne. He favored sowing in September, when the land was in a suitable state after irrigating. The warm weather conditions were then suitable for the young plants to outstrip weeds; though it was important before sowing to get land as clean as possible by thorough cultivation. Cover crops he considered unnecessary and to be avoided, as lucerne being a sun-loving plant, should not be shaded by a crop which, for a time, would outstrip it. In regard to replanting lucerne where it had partly died out, usually resowing among older lucerne was unsatisfactory, as the young growth was choked before it could become strong, and it was difficult to cultivate such land to a sufficient depth. It was often better to plough the field up and resow the whole. Much interest was manifested in a cultivator for working established lucerne. Some machines tore up or cut the crowns too severely, but a lucerne renovator had been placed on the market which had proved a great success, because it loosened the soil around the plants, and damage was reduced to a minimum.

## PARILLA WELL (Average annual rainfall, 16in. to 17in.).

August 1st.—Present: 10 members.

Fallowing.—Mr. J. W. Johnston read a paper on fallowing, in which he said that two systems of fallowing were necessary in that district, one for the land with mallee shoots on it, and the other for country which had been thoroughly cleared, and was liable to drift. Dealing first with the bush land he said that it was best to fallow in June or July, with mouldboard ploughs to a depth of 3in. or 3½in. on flats, and from 2in. to 2½in. on sandhills. If the flats and hills were very thick with shoots, &c. the land should be harrowed and the flats should be worked with cultivator and harrows in September or October to kill any weeds and prevent the land becoming too hard. It should then be left to the sheep until after the harvest.

If rain fell after harvest every effort should be put into cultivating and harrowing, because those workings, at the end of summer, when moisture was in the ground, were splendid for the crop. If there were no sign of weeds he recommended drilling in and harrowing behind the drill. With land that had been cleared the task was more difficult, because of the drift. It was best to fallow the cleared land and not disturb it again until harvest. If any rain fell at the end of summer, however, it should be worked over.

**Sheep.**—A paper on this subject was also read by Mr. J. W. Johnston, who insisted that sheep were a necessity on the farm to provide meat and keep the fallow free from weeds. Sheep bred on the farm were much more quiet than those brought from other districts, more especially if brought from stations. Quiet sheep were the most profitable. He preferred Merino-Lincoln cross ewes for breeding in that district, because of their large frames and quiet dispositions, and also because they were good milkers and good doers. Any of the British breeds of rams, if mated with such ewes, would produce good lambs. If they were kept for mutton on the farm they would be found to be good doers, and would cut a fair fleece. Merino ewes did not make good mothers, and if disturbed by foxes or dogs deserted their lambs. Oats and oaten hay should be stored to carry sheep over the early winter in good condition.

## ROSY PINE.

June 14th.—Present: 14 members.

**Summer v. Winter Fallowing.**—Setting out that he favored fallowing during the months of February and March instead of June and July, Mr. C. Lee, in a paper advocating that proposition, urged that in the first place, by that method a better germination of weeds would be secured and that six horses would do as much work in February as eight could perform in June or July, and look much better for the feed which they would get. More stumps would come out in February than June, a big gain to a scrub farmer. Every scrub farmer should aim at improving his land for sheep-carrying purposes, and to that end should plough 250 acres of stubble land in February and March, after burning off, and allow the land to remain in the rough furrow throughout the winter months. About the middle of September he should assist his sheep and other stock to get rid of the weeds and rubbish as quickly as possible. He preferred using the disc harrow or barger, to be followed by a thorough harrowing, to destroy the weeds, before turning the land over, as a final finish before harvest with a mouldboard skim plough to a depth of not more than 3in. As the land would then be in a fine condition he preferred to leave the land rough after the final ploughing. If any weeds should appear after any summer rain he would run sheep over the land, because they would tend to pack the soil and keep the land from drifting. An advantage to be derived from that system was that, when seeding had been finished, the horses could be turned into the paddocks to recoup their depleted energies. The farmer would have more time to deal with the necessary work of clearing stump shoots and other rubbish off the fallowed ground before commencing to work the land again in September. There would also be five or six months good pasturage off the fallow during lambing time when it was most needed, and the droppings would enrich the soil when finally turned under in the spring with the green growth. Winter rains would soak in better and the moisture be more evenly distributed through the fallowed field if broken up early than if ploughed in June or July. Stable manure was the best fertiliser for sandy land, because it needed organic matter and nitrogen to make it productive. Failing sufficient stable manure a crop of rye, with which red clover, vetches, or even oats had been sown, could be turned in. It could be sown in February and ploughed in and allowed to go on for feed until September, when it could be ploughed in to a depth of 4in. or 5in. to ensure a good covering for the green manure. If successful it could be sown every third year. Phosphoric acid, as contained in superphosphates, varied in its results proportionately to the humus in the soil, hence the humus might be regarded as a retainer of phosphoric acid in an available condition, an important indication of the necessity for maintaining the supply of organic matter in the sandy soils, which they were constantly manuring with superphosphates with very disappointing results. Mr. F. G. Bonnin was averse to making the second ploughing so deep. The subsoil should be packed tight, and unless rolled the condition would be conducive to takeall. Sheep would tend to make sand drift instead of packing it. Mr. C. E. Schiller remarked that the object of fallowing was the conservation of moisture, an object which would be defeated by ploughing in February. It was almost impossible to get the plough into the ground in dry weather. It would be a mistake to leave cultivating the land from February to September, because the rubbish would be too high to deal with. He favored the green manuring of sandhills, but preferred to feed it off, because the sheep's droppings provided humus. Working land down very fine was a mistake, because it drifted too easily. Mr. M. A. McCabe could not see how fallowing could be done in February, because by the time all the harvest work had been finished it was necessary to push on with seeding. Mr. A. Sands was against summer fallowing. Mr. R. T. Hay favored summer fallowing, but was against leaving it until September before turning back, because the soil was becoming too dry, and then it was best to leave it alone.

### WAIKERIE (Average annual rainfall, 8.89in.).

August 11th.—Present: 31 members.

Sheep on Irrigation Areas.—The subjoined suggestions, which he considered would be beneficial to the district, were made in a paper read by Mr. J. L. Smith:—(1) That every settler should have a plot of lucerne fenced off securely against dogs. The plot should be not more than a chain in width, but as many chains as possible in length. Hurdles should be placed in front, as well as in rear of sheep, to prevent them becoming bloated, and to give the portion grazed over a chance to grow. (2) The plot should be carefully cultivated and manured in order to provide ample feed for the quantity of stock to be kept on it. (3) A one chain by two chain plot should be sufficient to start with, say, a dozen sheep, at the end of September. The settler would kill seven or eight sheep, and then, for the remainder of the winter, when the lucerne had ceased to grow, he would have fewer sheep to provide for. Sheep might be purchased at Kapunda, which was a good market, trucked to Morgan, and then driven to Waikerie. Farmers should cooperate in their purchases. (4) The cost of constructing the fence would be £6 for a two chain by one chain plot (hurdles £4). Sheep, at present rates, would cost 35s. per head, and with 1s. 6d. for trucking, could be delivered in Waikerie for 36s. 6d. The sheep when killed should yield 60lbs. of mutton, which was 7½d. per pound. Against that was the skin, which would be worth anything up to 16s., and, if well woolled, perhaps more. The fat, head, tongue, and liver were worth 3s., which reduced the cost of the mutton to 17s. 6d., or 3½d. per pound, which was cheap meat. If a whole sheep were too much for one family, neighbors might kill alternately, and avoid the necessity for using salt meat. Mr. E. Jaeschke said that he had kept 500 sheep on five acres of lucerne for three months. The lucerne was cut and fed to the sheep. He preferred mating a Merino or Shropshire ram with Lincoln ewes for lamb raising. For feeding off rubbish growing on fruit blocks he recommended Merino sheep reared on grass country, and not saltbush-reared sheep, because they would eat the trees and vines first.

### WILKAWATT (average annual rainfall, 16in. to 17in.).

August 14th.—Present: 11 members and two visitors.

Pig Raising.—Dealing with the subject of pig raising, Mr. E. W. Brooker, in a brief paper, recommended that the pig yards should be built on sloping ground, with the sheds facing the east to provide shade in the summer time. There should be a small paddock adjoining for exercise until the pigs were ready to be fattened for market. Feeding troughs should be made of curved metal to facilitate cleansing. The boar should come from a good strain and be selected from a large litter. It should not be used for stud purposes until eight months old. The sow should be of kindly disposition, and have 12 or 14 well-formed teats. A sow which tended to fatten quickly was not the best from which to breed. After service the sow should be paddocked, where there were water and shelter, in order that she might have exercise and not grow too fat. She should be kept quiet. Only short straw should be used for bedding a sow with suckers.

Stocking the Mallee Farm.—Master K. Bowman read a short paper on stocking farms on the mallee. He expressed the view that the farmer should breed sufficient horse stock to replace the worn-out members of the team. Jersey cows and Berkshire or Middle York pigs were most suitable for the mallee farm.

BERRI, August 9th.—Mr. W. R. Lewis read a paper on the fertilising of the orchard, and it evoked considerable discussion.

BOOKPURNONG EAST, August 5th.—Mr. H. E. Phillis read a short paper on the value of farmyard manure. He favored putting the manure on the land with dray and fork. The chief value of farmyard manure was in the vegetable garden. Considerable discussion followed.

COONALPYN, September 8th.—Mr. J. F. Pitman read a paper on spring and bridle draught, in which he expressed preference for the spring draught, because with the bridle draught the whole set of bridles was in constant motion, and the parts were continually wearing, whereas with the spring draught each furrow jumped independently of any other, and only operated on its own spring. Mr. I. Angel read a paper on the implements required on a scrub farm, and said that he preferred a five-furrow mouldboard plough, spring draught; a disc cultivator to work up the fallow; a 15-disc drill worked with four horses, disc harrows, a 7ft. damp-weather stripper, a motor winnower, and a fire rake. Mr. Whitehead preferred a tine cultivator or skim plough for working the fallow. With a motor winnower a dampweather on the stripper would not be necessary. Mr. Wall favored a big acreage and big implements. Mr. Venning preferred narrow implements until the land was cleared.

FORSTER, August 12th.—In a consideration of the amount of superphospate per acre for dressing land, Mr. W. Searle, in a short paper, said that last year he had put on a heavy dressing, rather than carry the super. over, but the crops had not been very good. In the present year, with the same dressing, his crop was looking better than surrounding crops. Mr. Jas. Searle said that it would require a very heavy crop to make a heavy dressing of super. profitable. Mr. W. Day said that a dressing of 140lbs. per acre did not pay. He advocated 80lbs. per acre. Mr. C. Payne said it was more profitable to carry over super. than overdress.

GERANIUM, August 5th.—Sheep on the Farm.—In a paper on this subject Mr. W. A. Stacey expressed a preference for the crossbred. The quality of the sheep, both ewe and ram, should receive careful attention. In view of the shortage of sheep he thought every farmer should retain the best of the ewe lambs for breeding purposes, otherwise good crossbred ewes would become almost unobtainable. A good discussion followed. Mr. F. Norton said that it was not advisable to depend upon natural feed in raising fat lambs, and if cross breeds were raised it would be necessary to maintain two flocks of sheep, unless crossbred ewes could be purchased. Sheep saved the work of a team on the farm.

KI KI, August 12th.—Mr. E. T. Cooley read a paper on mallee farming, in which he advocated, after rolling and burning off, early ploughing to a depth of 2½in. to 3in., which would ensure a good seed bed, bury the ashes, and would not turn up too much sour ground. By using a four-furrow share plough, with as much draught as could be worked comfortably, it was possible to plough out 30cwt. or 2 tons of stumps per acre, which could be marketed from 8s. to 10s. per ton. At the lower figures the return would be 12s. per acre, which would just about pay the expenses of ploughing and the labor of picking up and carting the stumps. All new land should be harrowed twice, once lengthways and once across, which disturbed the rubbish and ensured the seed being well covered. Land treated in that way would have much better prospects of producing a crop if the spring were dry, because the depth of the ploughing would allow the plant to take a fairly deep root and the pulling out of the stumps left a considerable area practically cleared.

MANTUNG, August 10th.—Mr. G. N. Baker read a paper on the care of farm implements, in which he advocated a timely overhaul of all the farm implements, in order that they might be in perfect condition when required for use. A good substantial weather-proof shed for housing the implements and machinery was also an essential, and it was there that the farmer should employ wet days in overhauling, cleaning, and painting his implements and replacing fittings.

MORGAN, August 12th.—The care of the horse was dealt with by Mr. J. Pope in a short paper, in which he advocated greater attention to the fitting of the winkers, collar, and hames, also that the dry sweat should be cleaned off the collar before it was used, and the stuffing of the cart saddle frequently attended to in order to avoid any chance of giving the horse a sore back. The swingletree should be wide enough, when a horse was worked in chains, to keep the chains well off the ribs. The shoes should be frequently attended to, and not allowed to remain on too long.

POMPOOTA, August 24th.—A discussion took place on the question whether it was more profitable to sell milk or separate it, and the opinions were about equally divided. Those in favor of selling the milk urged that it brought in an immediate cash return, which was an important advantage to those who had no capital. On the other hand, it was contended that it was necessary to separate the milk in order to feed the pigs, which were one of the most profitable animals on the farm.

RAMCO, September 18th.—A discussion took place on the question whether early or late pruning of vines was the more advantageous. One grower stated that late pruning—after terminals had commenced to shoot—appeared to increase the yield. One of his rows, which had consistently given the least yield, had, when pruned after the terminals had commenced to shoot, shown an appreciable increase in yield. Mr. R. Stanley expressd the opinion that if such a practice were persisted in, the vines would show a weakened growth.

ROSY PINE, August 9th.—Members discussed the best method of destroying lice on pigs; the relative values of vertical and horizontal engines; the best food for a calf, when there was insufficient milk; and the most suitable age for the castration of colts.

WOODLEIGH, August 12th.—Mr. F. Petch read a paper on mixed farming. Discussion followed, and it was agreed that it was not profitable to breed surplus horses for the market. Only sufficient for maintaining the full strength required on the farm should be bred. It was also agreed that the continuous rearing of chickens, without changing the rooster, was the cause of most of the setbacks received in the poultry yard.

WOLLOWA, August 17th.—Mr. J. T. Simper read a paper on the care of farm machinery, in which he contended that the proper care of machinery and the keeping of it in thorough repair added years to its life, and was a substantial economy in farm management. All machinery should be housed, properly oiled and overhauled, and the woodwork painted at least once in two years. A blacksmith's shop was essential on a farm as a convenience, to keep the repair bill down and prolong the life of the machines. Supplies of nuts and bolts, &c., should be kept, so that when there was a breakage it could be effectively repaired.

## SOUTH AND HILLS DISTRICT.

### CYGNET RIVER.

August 10th.—Present: six members.

REARING AND FEEDING CALVES.—The calf should be taken from its mother, declared Mr. A. W. Miller in a paper entitled "Rearing and Feeding Calves," within 24 hours of birth, and 12 hours should elapse before an attempt was made to feed it. It would then be thirsty and take feed readily. For the first 10 days milk fresh from the cow should be given. Some of the morning's milk should be saved and given, sufficiently warmed, at noon. The change from fresh milk to skim milk should not be made too suddenly. A beginning should be made by giving skim milk at midday until the calf was a month old, and then all skim milk should be given at regular times, and always warm. Too much should not be given at a time. If separator milk be used, a cupful of linseed, boiled to a jelly, given at each feeding would enable the calf to thrive. The calf pen should have solid floors and plenty of straw for bedding. It should be cleaned out regularly and whitewashed occasionally. When two months old the calf or calves should be placed in a paddock an acre or so in extent securely fenced. A water trough should be provided, and feed boxes, in which bran, chaff, and, if possible a few oats should be placed, because the calf must be kept thriving. As much milk as the calf could assimilate should be given to it. If there were plenty of green feed the calf should have it, but the skim milk should be continued until it was four months old. At 12 months old it should be able to look after itself. Mr. R. Loader contended that a calf could look after itself when eight months old.

### HARTLEY (Average annual rainfall, 15in. to 16in.).

August 9th.—Present: 16 members.

Farm Appearances.—Mr. C. M. Hudd read a short paper dealing with the appearance of the farm, in which he advocated the planting of trees, keeping the fences in good repair, and having a place for everything and everything in its place, otherwise valuable time would be wasted in looking for things. Broken tools should be repaired at once, and machinery overhauled a couple of months before being used.

Fallow and its Working.—Mr. F. Clark read a short paper on fallow and its working, in which he declared that he was averse to growing summer crops on fallow, because it took the fertility out of the ground and permitted weeds to grow.

Water Tanks—The cheapest and best of water tanks, declared Mr. J. M. Hudd, in a paper discussing that subject, was one constructed of bricks and cement, and should hold about 9,000 gallons. It should measure 14ft. 3in. diameter, by a depth of 9ft. on the inside. A foundation 9in. in depth should be dug out and filled with concrete to a depth of 5in. That should be covered over with straps of wire from the centre to the circumference, the ends being turned up, and then another 4in. of concrete put in. One row of a 9in. brick wall should be laid and then a 4½in. row, or a single brick all the way, and held together with three parts sand and one of cement. When the wall had been completed, three bands of pig netting (150 yards) should be laid around the tank and tightened with a wire strainer. Then nine rows of No. 8 white wire should be placed in the same way, and the zigzag should be pulled to take up the slack. The wire should be flushed up with five of fine gravel and one of cement, and again with five of sand and one of cement. About 1in. of cement concrete should then be put in (3 to 1), and it should be plastered with a mixture of two of fine sand and one of cement. The cost would be as follows:—2,200 bricks, £4 19s.; cement, 10 bags, £4 4s.; 50 yards netting, £1 7s. 9d.; ½cwt. wire, 10s.; four bags lime at 2s. 6d., 10s.; labor, 12 days at 8s., £4 16s.; four loads gravel, two loads of sand. Total, £16 6s. 9d.

### INMAN VALLEY (Average annual rainfall, 26in. to 27in.).

August 10th.—Present: seven members and nine visitors.

Care of the Breeding Ewe.—Under this title Mr. H. J. Meyer read a paper in which he urged that the utmost care and attention should be bestowed on lambing ewes. In mating, there should be a ram to every 50 ewes, but the more rams in reason the better, because the lambing season was then less protracted. If Lincoln rams were used, those with small heads should be selected in order to minimise the difficulty of the ewes in lambing. A month before lambing the ewes should be crutched, but great care should be taken in performing that operation, or more harm than good might be done. They should then be placed in a well-sheltered paddock with not too much feed, in order that the ewe might gain exercise in hunting for her forage. The ewes should be visited once or twice every day, especially if a Lincoln ram be used, because the maiden ewes would, in many cases, have great difficulty in lambing. It would be necessary to expend time and patience in walking about the ewes, which suffered from cramp or exhaustion after lambing. When the circulation was restored the ewe could be left to take care of herself. In the case of ewes which dragged their hind quarters along the ground and were unable to lamb—and there had been many such cases that year—the condition was serious, and the chances were that they would not recover. After those ewes had been relieved of their lambs, they should be located in a warm place and allowed to rest. A dose of brandy or other stimulant if the weather were cold, would do good. If the ewe would not take to her lamb she would be placed in a small yard or tied up in the paddock, a method which he had adopted with great success. It was essential that all dead lambs should be removed at once. When the lambing was over the ewes and lambs should be placed in a paddock with the best feed procurable, so that the lambs might not receive a check, especially was that the case in respect to export lambs, which required abundance of feed. A ewe and lamb were equal to two dry sheep in the amount of feed they consumed. When three weeks or a month old the lambs should be marked. In driving to the yard it generally occurred that at the gateway the lambs all hung to the outside of the flock, and unless care were taken, there would be a break away. Having yarded the sheep it was important that the instruments should be bright and clean, or else there would be a great danger of loss through tetanus. The lambs should not be put back in the yard with the ewes after the operation, but should be placed in a different yard, where they would escape the knocking about so detrimental to them. Care should be taken when the flock was turned into the paddock again to see that the lambs, especially the very young ones, were mothered. The ewes became unsettled after yarding and were liable to wander off. The young lambs generally got down just inside the gateway, and, if the mothers were not steadied, there was a risk of some lambs not finding their mothers. After the severe time they had been through they would probably succumb, unless they got a drink pretty quickly. In the discussion which ensued reference was made to the number of ewes which have this season shown a decided weakness in the back, causing them to drag their hindquarters, and, at the same time, were unable to give birth to their lamb without assistance.

## INMAN VALLEY (Average annual rainfall, 26in. to 27in.).

September 7th.—Present: 16 members and one visitor.

How to make Farm Life Attractive.—Commencing with the declaration that no trade or calling should offer greater attractions than that of the full, free country life, Mr. H. J. Jagger in a paper "How to make Farm Life Attractive," proceeded that any business to be attractive must be a paying business, and if they wished rural pursuits to be attractive, they must see that they were paying propositions. There were four reasons why farm life should recommend itself to the young man—(1) Its comparative certainty of success, (2) its independence, (3) because it offered scope for the greatest intelligence of the nation, and (4) the hopefulness of the future. The sons on a farm should always receive a reasonable allowance. It often happened that whilst the farm hand received £2 or £2 10s. per week, the son had to scratch along with a few shillings. When they were old enough the sons should be made partners, not necessarily taking an equal share with the father, but a portion of the profits, if only 5 per cent., or, in the case of the girls, they should have the management of the poultry, reserving sufficient eggs and poultry for the household. Where there were several sons it was advisable to give them the management of different departments, and they should be consulted and encouraged to express their opinions as to various farm questions. Generally the welfare and the convenience and comfort of all on the farm should be studied as far as possible.

## MILANG.

August 12th.—Present: 37 members and several visitors.

Construction of Farm Buildings.—Given good material and properly constructed, stone buildings were the best and cheapest, insisted Mr. D. S. McBain in a paper which discussed the construction of buildings on a farm. He recommended a circular roof of galvanized iron, because such a small amount of timber was required, and it could be made large enough to comprise stable, cowshed, chaffhouse, and separator room. It would not leak and would resist almost any wind. Running doors, constructed of galvanized iron and oregon, should be provided. If properly hung, they could be opened and shut with the utmost ease on the roughest days. The best kind of floor for cowsheds, stables, pigsties, and, in fact, any farm buildings, could be made by breaking down limestone to a depth of six or seven inches, graded to the slope required for drainage. It should be well wetted and rammed. Then three parts of clean sand should be mixed with one of cement, wetted to the consistency of stiff mortar and spread over the stone with a trowel. It should then be rammed lightly, the surface having been wetted with a little water sprinkled on with a watering can. Such a floor would bear hoof and wheel traffic without wearing. He knew a floor of that description on which from 15 to 25 cows were milked throughout the year. It was cleaned and swept twice a day and although it had been down two years it showed no sign of wear. The floor was not expensive if the stone could be obtained readily, and one cask of cement would be sufficient to cover 300 square feet. Ramming the cement produced a surface slightly rough, which prevented the stock from slipping. It was much cheaper than brick, lasted longer, and could be easily put down by anyone on the farm.

### URAIDLA AND SUMMERTOWN (Average annual rainfall, 44.35in.).

July 3rd.—Present: 15 members and two visitors.

WATER IN THE HILLS.—A water supply of 4,000galls. or 5,000galls. per hour was necessary for a farm of 12 or 15 acres in the hills, declared Mr. J. S. Williamson, in a paper devoted to the consideration of water in the hills. In selecting a site for the well a spot should be chosen where the supply was not too deep. It was advisable to find two parallel makes of country rock and sink the well about 100ft. to the east of the spot where the two formations junctioned on the surface. That would ensure cutting the junction of the two formations at a depth of 100ft. or thereabouts. It was necessary to sink to that depth to ensure a good supply. Places on which the water remained until the summer advanced and then dried up should be avoided in seeking well sites, because it was evident that the rock was too hard to absorb the water. When the well had been sunk a drive should be put in at the bottom, running east and west. The timber used should be 9 x 2, and jammed (not "joggled") in. Timber "joggled" in was always loose, and would not hold in bad ground. A 6 h.p. or 8 h.p. engine would be required, a duplex pump, and a concrete tank to hold about 20,000galls. The tank should be erected in a high position. All mains should be 3in. or 4in. He was averse to bore holes, because the well was much better and just as cheap. The pump in the well was easier to attend to and would throw twice the quantity of water for the same sized pump.

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### WOODSIDE (Average annual rainfall, 31.95in.).

August 16th.—Present: six members.

RE-ESTABLISHMENT OF OUR PASTURE LANDS.—Mr. J. Caldwell, in a paper dealing with the re-establishment of pasture lands in the district, said that three factors had operated in impoverishing and exhausting the pastures in that district:—(1) Cropping the land and leaving it to the mercy of the weeds; (2) overstocking and leaving the ground so bare that the winter rains washed away all ingredients which might have nourished or re-established the pasture; and (3) the encroachments of the natural scrub when the grass has been fed off. To combat those influences, he recommended the thorough drainage of all lands used for pasturage, each valley being provided with a deep centre drain, with cross drains leading to it. The drains could be taken out with a mouldboard plough at the end of winter so that the ground might be returfed before the following winter, and so prevent the ground being washed away. Cultivated land, intended for pasturage, should be sown with some forage seed as soon as the crop had been harvested. Exhausted virgin pastures should be given a full year's rest. Clover hay, cut when ripe, should be fed to the stock in the paddocks, in order that the seeds might be distributed in the droppings and help to re-establish good grasses. The improvement of the pasturage should be taken in hand systematically and not left to chance. Scrub should be broken down, the land ploughed and sown and turned to some account.

CHERRY GARDENS, August 8th.—Discussion took place on the clipping of horses. Mr. C. Ricks found that horses when clipped did not sweat so freely and were much easier to groom. Though the winters were more severe in England than in Australia, clipping was more general in the former country. When horses were clipped it was necessary to provide good stabling for them, and they should be rugged when not working in cold weather. Mr. H. Jacobs favored half clipping, or skirting, which did not necessitate the use of rugs. That portion of the body requiring most protection from cold retained its natural coat, and the ribs and flank, which usually remained wet with sweat for the longest period, dried quickly, and contributed to the comfort of the horse. Mr. F. Brumby, a visitor, said that the condition of a horse was more easily maintained when it was clipped, and it was not so tired nor sluggish after work.

CHERRY GARDENS, September 12th.—A discussion took place on the question whether it was profitable to grow wattle bark, and the consensus of opinion was that at the low prices which had been ruling in recent years and the increased cost of labor the cultivation of wattle bark was not profitable, though wattle might be grown on some of the poorer lands.

CYGNET RIVER, September 12th.—Mr. R. Loader read a paper dealing with the care of farm machinery, advocating initially the necessity for keeping it in a shelter shed. If there were no shed available or possible a waterproof covering might be used, and the ironwork coated with waterproof paint. The machinery in use should be oiled often, including even the pull links on the plough. Drilling machines should not be lubricated with oil, but soapy water. Discussion ensued, in which many questions were asked and satisfactorily answered.

MACGILLIVRAY, August 8th.—Mr. A. J. Nicholls read two papers, one "Green Manuring," the other "Growing White Mustard." Discussion followed, members generally agreeing that it would be advisable to observe the effect of the operation on the following crop.

MOUNT BARKER, August 9th.—Mr. Stephenson read a paper on the ideal farm, in which he pictured a holding on the high road, near a railway, and divided into small paddocks, well fenced, and with a homestead surrounded by a hedge. Shelter should be provided in the paddocks for the cattle, and there should be permanent water, best of all a running creek. On the high ground the stables, cowyards, &c., should be placed in order that they might be properly drained. There should be an orchard and a vegetable garden.

NARRUNG, September 9th.—In a paper pointing out how spare time might be spent on a farm, Mr. J. B. Steer advised first attention to the machinery and plant generally. All the harness might be oiled with neatsfoot oil which had been warmed, and the chains might be repaired. Iron swingletrees could be made from old plough beams, and spreaders could be made with ½-in. round iron, which was lighter and handier than wood. The seed wheat bags should be patched and put away, in order to avoid delay at harvest time and the extra expense of paying harvest rates of wages for mending bags. The bags might be stored in a zinc-lined case or suspended on a rail hanging by wire from the roof of the barn. The stables and yards should be cleaned, and the drainage—a very needful matter—attended to. Cultivator shares might be sharpened, and, if the shares were chilled hard, their life would be almost doubled.

## SOUTH-EAST DISTRICT.

### KYBYBOLITE (average annual rainfall, 22in.).

August 16th.—Present: nine members and three visitors.

FEEDING OFF CROPS.—At the outset of a paper on feeding off crops, Mr. H. R. Scholz advanced as reasons for the practice that, in many cases, crops might have been sown too early, or, owing to rapid growth, might have become too forward for the season, and in such cases feeding off prevented them growing too rankly and going down too easily. When it had been fed off the plant stooled better and was retarded in growth, attaining only the medium height of 3ft. or 4ft., which yielded more heavily than crops which had not been fed off. Three years ago he had put 130 sheep in a 30-acre paddock, sown with Federation wheat, for 16 days. From that land he harvested 10 bags of wheat per acre. In the following year, finding the crop too high, he put 130 sheep on 13 acres of Federation wheat for three weeks, and then turned 350 ewes, with as many lambs three months old, on to it for a fortnight, and the crop was eaten off bare and looked like fallow. There was a drought that year, but he reaped 12 bushels per acre from that land. Adjoining ground, which had not been fed off, yielded only 9 bushels. Feeding off with sheep improved the seed bed, as well as the plant itself, and the ground was trodden firm by the sheep in feeding, facilitating the draining off of surface water. Farmers who owned about 100 sheep could only effectively arrange for feeding off by having several 30-acre paddocks, and shifting the sheep as occasion required. Mr. A. Bradley said that feeding off tests at Roseworthy gave results below the average, but everything depended on crop conditions. Oats were more suitable for feeding off in that district than wheat, because of their greater liability to grow rankly and go down. Mr. E. C. H. Schinckel gave instances of good results obtained from feeding off. Mr. S. Shepherd said that he had a striking example of the benefits of feeding off oats last year, when excellent yields were obtained. He was convinced that feeding off was profitable under any conditions. Mr. G. H. Hahn said that everything depended upon the condition of the crop. When the plant was tall and spindly it should be fed off, but in ordinary circumstances, with a good healthy well-stooled plant, he was averse to feeding off.

## LUCINDALE (Average annual rainfall, 23.32in.).

August 19th.—Present: 10 members.

**Ration Sheep.**—In a paper dealing with the keeping of ration sheep Mr. W. M. Secker said that only really well-conditioned sheep should be killed, and that might be accomplished on a farm by reserving a small paddock for the sole purpose of fattening a few sheep at a time. He always picked out for fattening aged sheep, and he avoided selecting well-woolled animals. It was a mistake to use poor mutton for domestic purposes, because it was full of sinews, and was flavorless, besides yielding no fat or dripping. One well-conditioned sheep provided as much meat as two poor ones. Good mutton was better flavored and more nourishing than poor stuff. In winter it was of no consequence if the ration sheep were large, because the meat would keep in cool weather, but, in the hot season, he selected smaller sheep, because there was always a chance of it going bad. Where families were small it was always necessary to corn some of the mutton. Killing poor sheep was wasteful, reducing unnecessarily the numbers of the flock and the wool clip. In the discussion which ensued Mr. L. McInnes said that he preferred to sow about 10 or 12 acres with barley, and pick four and six-tooth culls for wool, and fatten them on the barley. They were better to eat than old sheep, whose meat was tough. Mr. J. McInnes said that the flesh of old sheep, though they were in prime condition, was tough. Mr. T. Ferguson said that in breeding a special line of sheep it was profitable to keep the old sheep, provided their wool production did not deteriorate. The old sheep should be mouthed, and the teeth of those which were broken mouthed should be extracted, because such teeth were usually long and loose, and prevented them from getting a good grip of the grass. After the removal of the teeth the sheep usually deteriorated somewhat, but after a brief period would fatten much more effectively, because they were able to get a better grip of the grass between their gums. Mr. A. Carmichael believed in fattening and killing off old sheep, and also in the extraction of the teeth from broken-mouthed animals. Mr. J. McMorrow stated that it was the experience of butchers that old sheep required to be hung three or four days before using, to make the flesh tender. Mr. P. Dow was of opinion that it depended on the quality of a man's land whether he could breed sufficient lambs to enable him to kill the young sheep for his own use. Mr. T. Ferguson produced a bushel of annual saltbush seed for distribution. He had grown it himself with good results. A patch which he irrigated grew to a height of 6ft. Discussion took place on the blowfly trouble with sheep, and the general opinion was that breeding ewes should be "breeched." Mr. W. M. Secker stated that he had breeched about 700 breeding ewes, and they produced half a bale of wool. Only three of the 700 ewes "breeched" had been touched with flies, and that happened through the ewes getting down in lambing. Mr. P. Burke said that he had no trouble with the ewes which were "breeched," but a great deal with those which were not.

## MILLICENT (average annual rainfall, 29.25in.).

August 8th.—Present: eight members.

**Sugar Beet.**—In a paper dealing with the growing of beet Mr. H. Hart said that last season, which was very dry, he received the seed too late. He sowed on October 18th, in drills 3ft. apart, 90 plants per chain. The crop weighed 116lbs., without the tops, equal to 12 tons per acre. The ground was ferny land, and white sand with a little clay in the subsoil. Many of the leaves were scorched by the hot weather. Growing beet was very similar to the growing of mangolds. He favoured drills wide enough apart for horse hoeing. The plants sent out roots for moisture and manure. The quantity of seed required, if good, was 4lbs. to the acre, pressed into the soil about half to three-quarters of an inch for early sowing and 1in. for later, when the soil was becoming dry. A good garden drill was best to use, unless an ordinary corn drill was contrived, with pressure wheels to fix the seed in thoroughly. In the course of discussion it was agreed that sowing need not be so early as at Maffra, and that the middle of August was time enough. Several members decided to try experimental plots and to have samples sent to Maffra for analysis.

## NARACOORTE (Average annual rainfall, 22.60in.).

July 8th.—Present: 34 members.

Potatoes and Onions—How to Grow them.—To prepare ground for a potato crop, observed Mr. H. J. Coad, in a paper dealing with the method of growing potato and onion crops, it should be ploughed to a depth of 6in. some time before planting. If the land were stiff or very lumpy it should be worked down until a fine seed bed had been obtained. Then, if bone super. or other manures were to be used, they should be drilled in to a depth of 3in. The potatoes should be ploughed in, in rows 3ft. apart, but the seed should not be more than 3in. under the soil when the next furrow covered it. Manure should be drilled in rather than put in the rows with the seed, as the latter method tended to burn the plant to a certain extent, especially with cut seed, and the plant was weakened. If farmyard or stable manure were employed it should not be spread too thickly, because potatoes did not require much manure. The manure should be ploughed in 6in. in the same way as other manures; but if stable manure were used, 2cwts. or 3cwts. of super. per acre should be drilled in with it. After planting, the harrow should be run over the ground, which would then have a fine surface. Seed potatoes should be carefully picked over before planting, and all those with delicate shoots eliminated, because it was useless to prepare land well for inferior seed. He preferred to plant Redskins, which did well on either dry or moist ground. Snowflake did well if planted late on moist, swampy soil. They matured slowly, but grew rapidly after the early rains, and the potatoes grown on swampy land kept better than those grown on dry land. Early potatoes should be planted about the end of July in order that the young potatoes might miss the frosts. Summer crops should be sown about the end of October, and would be ready in March. If potatoes had matured by the middle of March they should be dug before the early rains, because, if left in the ground after the rain, they would rot. Potatoes should not be stored where the sun could shine or the wind blow on them, because their flavor became ruined thereby. Potatoes should be kept in a hole in the earth, covered over with plenty of straw. When taken out they were as fresh as when just dug. Seed should be covered over with damp bags in order to make it commence to shoot before planting. When the plants were 6in. in height all weeds should be hoed out. He was averse to using a ''scuffler'' to mound the potatoes, because it disturbed the outside roots and did more harm than good. Most farmers planted from 500 to 1,000 onion plants every year, and as they were easy to grow, they were often planted in a slovenly fashion. He preferred using fowl manure for onions, but it should not be spread too thickly, because it was liable to burn the plant. With 4cwts. or 5cwts. of artificial manure to the acre onions did well. They should be planted in rows 2ft. apart, with 8in. between the plants. He had tried early and late planting, and preferred having the plants transplanted as early as possible. About the middle of May was the best time to transplant, because the early onions were always milder than those grown later. The best varieties to grow were the Brown and White Spanish, because they matured early; but too many of that kind should not be planted, because a good, long-keeping onion should be grown as well. Brown's long-keeping onion was a good keeper. Other good varieties were:—Pineapple (a very large grower), Silver King, and Mammoth Pompeii. The last-named was an Italian variety, and a splendid grower. Onions should be kept quite free from weeds, and that could be very easily done by the use of a light hoe. The onion should be treated in very much the same manner as a potato, first hoeing out the weeds and then mounding up the earth around them in order that the sun might not shine on the bulbs. In the discussion which ensued, Mr. A. Johnstone said that potatoes used as seed were not really seed in the same sense as wheat. The grain of wheat contained the germ of life, but the germ of reproduction in the potato was contained in the eye, and there was no advantage in grading potatoes for seed. Potatoes flowered and produced seed, just as other plants, but the seed was not used for reproduction.

## PENOLA (Average annual rainfall, 26.78in.).

August 5th.—Present: 10 members.

Working Black Soil.—In cultivating black soil Mr. P. H. Kilsby, in a paper treating with that subject, recommended that ploughing should be commenced about the middle of February with a disc plough, and continued as long as the disc would work, which would only be until the wet weather set in, when the work should be completed with a stump-jump plough. He preferred the disc because it left the ground more open to the sun and wind and broke down much better at seeding time. He preferred ploughing 4½in. deep, especially for potatoes, mangolds, and peas, but 4in. was sufficient for other crops. After harvest the crops which it was intended should be sown should be mapped out, and the variety of seed to be allotted to each paddock or plot determined. The barley area should be ploughed first, because it needed more working than the others. It should be left open until a few weeks from sowing. After the barley ground had been treated the land for hay and oats should be ploughed, and lastly the paddocks devoted to wheat. The land should be worked well before seeding. He preferred for that work the stump-jump cultivator with V-point shares, which stirred the ground well, and made a good seed bed. The ground should be harrowed twice before drilling, and afterwards as well. Seeding time was determined by the season, the general practice being to wait for the rain before sowing, in order that all rubbish might be destroyed and a better seed bed formed than if the seed were put in dry. He advocated sowing for hay in May, 1½bush. of Algerian oats and ½bush. of White Tuscan wheat, with 80lbs. of mineral super. After finishing the hay crop, the oats which it was intended to thresh for grain should be sown. The wheat crop should be put in from the end of May to the end of June, but last year he had derived the best results from Gluyas sown on August 23rd, which averaged 22bush., but they had splendid rains in September and October. He intended to repeat the experiment this season. He strongly advocated sowing Gluyas in black heavy land. There was no trouble in harvesting it. Barley land should be well worked, as it was the most profitable. It should be ploughed in February and March, cultivated in June and July, and sown from July 20th to the end of August, at the rate of 1bush. of Duckbill barley and 80lbs. of super. to the acre. For potatoes black soils should be ploughed to a depth of 4½in. in May, and worked at least every fortnight thereafter with a good cultivator, and after a few days it should be harrowed, until October, when the ground should be ploughed again, and the potatoes sown. He adopted that method last year, and then, after the potatoes had been planted, he kept the harrows going every few days until the potatoes were too high, and then he put the horse cultivator through them. As a result, all through the summer the ground remained loose, whereas in the next paddock, which had been only treated with plough and harrow, the ground was very hard, and displayed cracks all over it. With more thorough working the results from the black land would be better, and he was confident it would grow potatoes equal to those produced on the Millicent flats. Mr. D. McKay said that potatoes sprinkled with burnt lime were practically moth proof.

At the meeting on July 8th, discussion took place on a paper read many years ago by Mr. Adamson on "Wheat Growing." Mr. Ockley pointed out that Federation wheat had fallen from its prominent position, and had been succeeded by Yandilla King and Gluyas. Mr. Kilsby advocated June and July sowings of wheat, which had yielded, in his experience, 4bush. or 5bush. more than he had obtained from May seeding. Wheat was a long way behind Duckbill barley as a revenue producer, 22bush. of wheat not being equal financially to 65bush. of barley, the stubble of which was also of greater value than that of wheat. Mr. Moran favored Federation wheat on a black soil, because it was less liable to rust. Wheat would prove far more profitable when a rotation suitable to the plains had been evolved. Replying to a question with regard to bringing grown sheep from the Northern areas to that district, Mr. D. A. Fullerton said the only advantage to be gained was that they would yield more wool the first shearing, because they would be carrying more than 12 months' growth before the South-East shearing season arrived. In many cases the flocks brought from the North were only cull drafts. He also referred to the wonderful improvement of much of the country in that district, the unhealthy conditions producing "coastiness" having been removed by a system of drainage.

## TANTANOOLA.

August 5th.—Present: 21 members.

Agricultural Experiences.—A paper on agriculture was read by Mr. C. G. Searle, in which he detailed his experiences with two plots of land as follows:—Plot 1.—First year—Ploughed in June; broadcasted with Cape barley and 60lbs. super. per acre; returns, nil. Second year—Ploughed in July; harrowed three times; drilled with 60lbs. oats and 60lbs. super.; returns, two tons of hay per acre. Third year—Ploughed in April; harrowed four times; drilled 62lbs. barley and 80lbs. super; returns, 30bush. per acre. Fourth year—Ploughed and sown with oats; returns, two and a half tons hay per acre. Fifth year—Ploughed and drilled with wheat, 60lbs per acre, and 80lbs mineral super.; returns, two tons of hay per acre. Sixth year—Ploughed and sown with oats as previously; returns, three tons of hay per acre. Seventh year—Ploughed in March; sown in May with Tuscan wheat, 60lbs., with 90lbs. super.; returns, 32bush. per acre. Cultivation was during a dry period. The wet season prevented a continuation because the land was in a low-lying situation. Plot 2.—First year—Ploughed in February, 4in. deep; cultivated three times; drilled with 90lbs. super. and 62lbs. English barley; returns, 40bush. per acre. Second year—Ploughed in March; cultivated three times; drilled with 90lbs. super. and 50lbs. Algerian oats; returns, three tons hay per acre. Third year—Ploughed in March; cultivated four times; drilled with 90lbs. super and 60lbs. Tuscan wheat; returns, two and a half tons of hay per acre. Fourth year—Ploughed in May; cultivated twice, harrowed once; drilled with 90lbs. super. and 60lbs. oats; returns, three tons hay per acre. The plot has been sown with wheat for the present season. The use of the spring-tooth cultivator and surface draining were necessary in order that the land might be worked when required.

KONGORONG, September 5th.—At the inaugural meeting of the Branch there was an interesting discussion led by Mr. F. R. Uphill on the disease locally known as "The Coast."

PENOLA, September 2nd.—A report was made that a pest in the oat crops in the district was making great headway. Various local matters were discussed and questions answered.

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CLARENCE GOODE,

*Minister of Agriculture.*

# POINTS FOR PRODUCERS.

### An Alien Weed.

In the May, 1916, issue of the *Journal*, attention was directed to the occurrence at Renmark of an alien weed which threatened to become as serious a pest as the Bathurst Burr. Realising the danger, the Government immediately took steps to cut out and burn the weed, which is known botanically as *Xanthium Canadense*. It is only reasonable to assume, however, that some of the plants escaped notice, and matured. As the area on which the weed was first discovered is subject to inundation, there is every reason to fear that any seeds which escaped destruction would be carried down stream, possibly finding their way through the various irrigating plants on to the reclaimed areas.

Land holders on the banks of the Murray will be doing a service to themselves and to the State by keeping a sharp look out for this unwelcome immigrant. Readers are referred to page 898 of the May issue, on which will be found an illustration of the plant in question.

### Publication Received.

"Money in Bees in Australasia," by Tarlton.—Rayment, Whitcombe, and Tombs, Limited.

### Conference of Dairy Factory Proprietors.

At a recent meeting of the Advisory Board of Agriculture, it was suggested that good might result from an attempt to hold a conference of representatives of various dairy factories in this State. It was thought that a gathering of interested parties, for the purpose of giving consideration to questions affecting the dairying industry, more especially from the standpoint of the factory manager, might tend to the attainment of a higher standard of the product, and generally make for a higher status for the industry. It is proposed that the gathering should be primarily of an educational character, consideration being given more especially to the technique of dairy produce manufacture, in addition to the marketing of produce. Various factory proprietors throughout the State have been communicated with in respect to the conference, the success of which will, of course, depend very largely upon the measure of support granted by those interested.

# INQUIRY DEPARTMENT.

**Any questions relating to methods of agriculture, horticulture, viticulture, dairying, &c., diseases of stock and poultry, insect and fungoid pests, the export of produce, and similar subjects, will be referred to the Government experts, and replies will be published in these pages for the benefit of producers generally. The name and address of the inquirer must accompany each question. Inquiries received from the question-boxes established by Branches of the Agricultural Bureau will be similarly dealt with. All correspondence should be addressed to "The Editor, *The Journal of Agriculture*, Adelaide."**

## VETERINARY INQUIRIES.

[Replies supplied by Mr. F. E. Place, B.V.Sc., M.R.C.V.S., Veterinary Lecturer.]

"T. E. D., Kingscote (K.I.), has a mare with film on eye from injury; eye does not seem to have been pierced.

Reply—Probably if a few drops of a solution of 2 grains of nitrate of silver to 1oz. of distilled water are applied to the eye daily it will improve, or a few grains of boracic acid may be blown in once or twice a week. It will probably take some weeks clearing. Do not be led into blowing in sugar or powdered glass.

"H. B.," Sevenhills, had a horse which was feeding in paddock; galloped in all right, shivered, staggered, and died in four minutes.

Reply—In all probability from over distension of the stomach, due to rapid fermentation induced by the gallop. Many such cases come to hand at this time of year, and the actual cause of death is mechanical interference with the heart beat.

"H. C. P.," Honiton, seeks advice in artificial rearing of foal.

Reply—With feed as plentiful as it is now, the mare should be able to bring up the two foals without extra feed, but if any is given a few pounds of bran and crushed oats daily will be best. Cow's milk should be diluted by one-third water, and a good pinch of sugar of milk dissolved in each pint. It should be fed warm, through a teat. Condensed milk is not so good as cow's, and at present prices too expensive. Five parts of water to one of milk may be given. The foal should be brought on to a little crushed oats and bran as early as possible, and when he takes to them the milk may be gradually decreased, and boiled linseed jelly substituted for some of it. Many foals so reared are quite as well grown as those brought up on their dam.

"A. K.," Tiparra, Paskeville, has a mare 9 years, which was off color, tucked up, driven 30 miles as a remedy, sluggish, off appetite; lay down, but not in pain; recovered in three days; water quite red.

Reply—The condition is known as hæmoglobinuria, and is the result of excessive nitrogenous waste in the system. You were lucky to get a recovery. Frequently on a journey there is complete paralysis of the hindquarters. A satisfactory treatment is small doses of turpentine in linseed oil. In your case no further treatment is necessary.

"W. A.," Wokurna, reports horses troubled with sore shoulders.

Reply—There seems to be poor horsemastership somewhere. Clean the shoulders after work every evening, beat out the collars at least once a week, for the worst have two collars for alternate days. Stop oats if given. Read "Sore Shoulders" in *Journal* last year. Give a tablespoon of sulphur once daily to each horse for a week. Mix two ounces white lead and a tablespoon pure carbolic acid in a pint of neatsfoot oil and dress shoulders and collar before work, at dinner time, and shoulders after work regularly. Offer a bonus to the teamster that gets his horses well in the shortest time.

"F. B.," Carrow, has a mare affected with rash which disappeared in about 12 hours.

Reply—The trouble was nettle rash, or *Urticaria*, which occurs generally in the spring, and is due to disorder of the blood. It is well to give a tablespoon of sulphur in the food for a week when it attacks an animal.

"E. R.," Cleve, has a cow with swellings like boils on udder.

Reply—The condition is cowpox. Dress twice a day with boracic ointment, and paint the worst with collodion. The milk may be used if boiled first.

"J. G.," Warratta Vale, reports sows as being itchy, weak in legs, with hard udder.

Reply—The troubles arise from worms, lice, and chill. Rub over with kerosine; rub warm lard into udder, and dress the ulcer with sulphur one part, boric acid seven parts. Give daily in food a tablespoon of a mixture of equal parts sulphur, saltpetre, and charcoal, and give cinders regularly in feed.

"J. B. T.," Sutherlands, had a colt 2 years, castrated; taken good care of; three weeks later enormous swellings occurred, and the animal died.

Reply—It is much better to let colts run out after the operation, as the exercise enables a good drainage to take place. In this case death resulted from absorption of septic matter.

"A. A.," Mount Hope, has a colt 3 years, with chaff in eye.

Reply—To make sure whether the chaff is still there, throw the colt, press on upper lid with first finger and lower with thumb and look, for often a piece of chaff goes but leaves its shape on the opaque eye. If still there take a pair of tweezers or a hairpin and use as forceps. A little 5 per cent. solution of cocaine assists in this performance. Afterwards dress the eye daily with a little solution made by dissolving 2 grains of nitrate of silver in an ounce of distilled or rain water. It will take some weeks for the eye to clear.

## DEATH OF FOALS.

### NAVEL OR JOINT ILL.

From different parts of the State come reports that losses are occurring amongst young foals. The symptoms, as given by an inquirer on Yorke Peninsula, are for the animals, 2 days or a fortnight after birth, to become very lame, with swellings on the knees, stifles, &c. They resist treatment, and if the swellings are lanced, foetid pus exudes. In the majority of cases the affected beasts die.

Mr. F. E. Place, B.V.Sc., M.R.C.V.S. (Government Veterinary Lecturer), states:—"This is navel or joint ill, technically, *Omphalo thrombo-phlebitis*. It is caused by a specific organism which obtains entry to the system through the navel. It is hard and expensive to treat; practically the only drug of any use is acetozone. Twenty grains are dissolved in pure water, and the navel and lanced sores dressed with the solution (¼pt. water) twice a day. Two tablespoons of the solution should be given as a drench twice a day as well. The disease is communicated both by dam and pasture, so when prevalent, as in this case, all foals' navels should be dressed either with tincture of iodine or a paste of equal parts chlorinated lime and boric acid, as soon as they are dropped, and if the navel remains moist, as often as required to dry it. In-foal mares should be removed from paddocks where it occurs, and these and yards, &c., should not be used for foaling mares for at least two seasons."

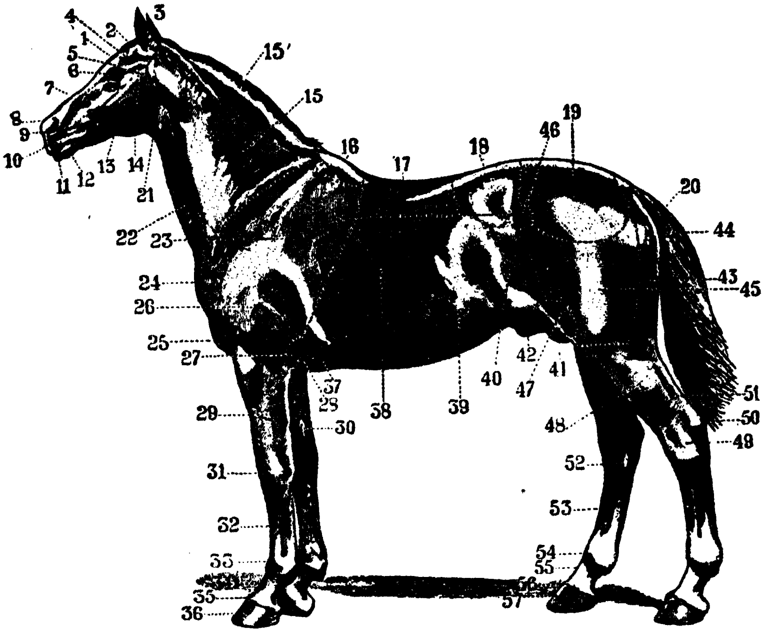

Fig. 1.—Exterior of the Horse: Side View.

REFERENCES.

1 Forehead.
2 Forelock.
3 Ear.
4 Supra-orbit.
5 Eyrebrow.
6 Eye.
7 Nose.
8 Nasal Peak.
9 Nostril.
10 Upper Lip.
11 Lower Lip.
12 Chin.
13 Cheek.
14 Temple.
15 Neck.
15' Crest.
16 Wither.
17 Back.
18 Loins

19 Croup.
20 Tail.
21 Throat.
22 Cervical Groove.
23 Shoulder.
24 Shoulder Point.
25 Breast.
26 Upper Arm.
27 Elbow.
28 Point of Elbow.
29 Forearm.
30 Chestnut.
31 Knee.
32 Canon.
33 Fetlock-joint.
34 Pastern.
35 Coronet.
36 Foot.
37 Brisket.
38 Chest.

39 Abdomen.
40 Flank.
41 Testicles.
42 Sheath.
43 Buttock.
44 Point of Buttock.
45 Thigh.
46 Haunch.
47 Stifle.
48 Leg or Gaskin.
49 Hock.
50 Point of Hock.
51 Tendo Achilles or Ham-string.
52 Chestnut.
53 Canon.
54 Fetlock-joint.
55 Pastern.
56 Coronet.
57 Foot.

# ROSEWORTHY AGRICULTURAL COLLEGE.

## SIXTH REPORT ON THE PERMANENT FIELD EXPERIMENTS, SEASONS 1904-1915.

[By Walter J. Colebatch, B.Sc., M.R.C.V.S., Principal, Roseworthy Agricultural College, and R. C. Scott, Assistant Experimentalist.]

*(Continued from page 195.)*

### (B)—MANURIAL EXPERIMENTS.

#### 1. PHOSPHATIC MANURES.

The experiments in progress concerning phosphatic fertilisers may be divided into three sections—

(*a*) Those that aim at discovering the effects of the residues of superphosphate on a crop of wheat when applied to the fallow in the previous year.

(*b*) Those that bear upon the direct and indirect effects of superphosphate when applied to wheat crops grown under two-course and three-course rotations.

(*c*) Those that have been designed to ascertain the merits of basic slag as a fertiliser for wheat comparatively with more soluble forms of phosphatic manure.

#### (*a*) Reversion Plots.

The first group of plots, which are known as Reversion Plots, were started last year in response to a number of inquiries as to the amount of manure that should be applied with seed sown on land that had failed to produce a crop the year before. It was generally considered that crops sown in 1915 on the failures of the drought year—1914—would not require a full dressing in order to ensure maximum returns, provided always that the 1914 application exceeded ½cwt. per acre. This conclusion was based on the knowledge that soils, generally speaking, possess high retentive powers for phosphoric acid. Even in years of heavy rainfall, the loss of this ingredient through leaching is inappreciable, except in soils of an open, porous nature, such as sands and light sandy loams. Nevertheless, it was not deemed wise to advocate the complete omission of superphosphate in 1915, even where heavy dressings, up to 2cwts. per acre, were habitually applied, for the reason that a readily soluble form of phosphoric acid at the time of germination is essential to a quick even braird, and the presence of such a stimulant could only be secured by the application of a further quantity of superphosphate with the grain. It was thought, however, that as long as sufficient water-soluble phosphoric acid to meet the initial demand of the young plant was supplied, the crop might be expected to satisfy its requirements in the matter of phosphoric acid by turning to account the unused portion of the 1914 dressing. The difficulty was, however, to form an idea as to the minimum proportion of the normal quantity of superphosphate that is necessary to promote a satisfactory germination and rapid early growth.

It is probable that the opinions expressed erred on the cautious side, as it would naturally be felt by those called upon to pronounce a verdict that much more harm would be apt to result from under-manuring than from the use of more than the crop required. It was considered, however, that something more definite was needed, in order to guide us in the matter, and we, therefore, determined to test the residual effects in permanent plots in accordance with the following scheme:—

| 1915. | | 1916. | | 1917. |
|---|---|---|---|---|
| Bare fallow .. | 1cwt. superphosphate.. | Wheat .. | No manure<br>½ cwt. super.<br>1 " "<br>2 " " | Bare fallow |
| Bare fallow .. | 2cwt. superphosphate.. | Wheat .. | No manure<br>½ cwt. super.<br>1 " "<br>2 " " | Bare fallow |

We recognised the difficulties that confront an experiment of this nature, and realise that the plots may have to be continued for a number of seasons without yielding results that will assist materially in the elucidation of the problem before us. At any rate, in the interests of the farming community we entertain the hope that this may actually happen. Eventually, however, we anticipate being able to obtain some figures that will prove to be both instructive and serviceable.

### (*b*) SUPERPHOSPHATE PLOTS.

### 1. *Direct Effect of Superphosphate Used in Bare Fallow-Wheat Rotation.*

We include under this title the second group of phosphatic fertiliser plots.

The influence of superphosphate on cereal production is recognised everywhere, but in no other part of the world has their use in agriculture been followed by such striking results and far-reaching effects as in Australia. To some extent, perhaps, it is the relative ineffectiveness of potassic and nitrogenous fertilisers that has thrown into relief the remarkable results obtained from the employment of water-soluble phosphatic manures.

Nothing that can be said, however, can detract in any way from the merits of this form of phosphoric acid under local conditions. Superphosphate is the predominating manure here, simply and solely because in general it is not found to be economical to grow crops without it, or to apply any other fertiliser either in conjunction with or in substitution for it. The extent to which it has come into use is evident by reference to the official statistics, which show that of the areas under cultivation in 1914 and 1915, the percentages dressed with superphosphates were 84.98 and 80.78 respectively. Under these circumstances it becomes a simple matter to understand why special interest always attaches to investigations into the actions of superphosphate in this country. This was one of the first subjects studied through the medium of permanent field plots at Roseworthy College, and we are now in a position to give some trustworthy average figures bearing upon certain phases of the question.

We have under trial quantitative tests with standard grade superphosphate on wheat grown on the two-course and also on the three-course rotation.

In the appended tables are shown the yields obtained under the bare fallow-wheat system from applications of 1cwt. and 2cwt. dressings of superphosphate per acre.

TABLE XI.—*Showing Effect of Different Quantities of Superphosphate—36/38 Grade—on Wheat Grown in Rotation with Bare Fallow,* 1905-15.

(*a*)—GRAIN YIELDS.

| Years. | No Manure. | | 1cwt. Superphosphate. | | 2cwts. Superphosphate. | |
|---|---|---|---|---|---|---|
| | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. |
| 1905 .................. | 21 | 55 | 28 | 56 | 30 | 11 |
| 1906 .................. | 17 | 13 | 23 | 43 | 20 | 48 |
| 1907 .................. | 14 | 36 | 20 | 31 | 17 | 53 |
| 1908 .................. | 24 | 48 | 32 | 46 | 33 | 53 |
| 1909 .................. | 24 | 47 | 29 | 54 | 29 | 32 |
| 1910 .................. | 18 | 18 | 19 | 49 | 22 | 2 |
| 1911 .................. | 9 | 0 | 14 | 7 | 14 | 38 |
| 1912 .................. | 10 | 43 | 18 | 11 | 19 | 50 |
| 1913 .................. | 2 | 39 | 5 | 4 | 7 | 32 |
| 1914 .................. | 6 | 17 | 6 | 9 | 11 | 34 |
| 1915 .................. | 21 | 35 | 23 | 32 | 25 | 49 |
| Means .......... | 15 | 37 | 20 | 15 | 21 | 15 |

TABLE XI.—*Showing Effect of Different Quantities of Superphosphate*—continued.

(*b*)—TOTAL PRODUCE AND HAY YIELDS.

| Years. | No Manure. T. | C. | L. | 1cwt. Superphosphate. T. | C. | L. | 2cwts. Superphosphate. T. | C. | L. |
|---|---|---|---|---|---|---|---|---|---|
| 1905 | 1 | 19 | 33 | 2 | 11 | 54 | 2 | 15 | 68 |
| 1906 | 1 | 18 | 63 | 2 | 8 | 100 | 2 | 6 | 62 |
| 1907 | 0 | 19 | 59 | 1 | 8 | 88 | 1 | 3 | 60 |
| 1908 | 1 | 16 | 1 | 2 | 11 | 26 | 2 | 15 | 84 |
| 1909 | 2 | 2 | 4 | 2 | 7 | 61 | 2 | 12 | 66 |
| 1910 | 1 | 17 | 104 | 2 | 5 | 98 | 2 | 8 | 14 |
| 1911 | 1 | 0 | 34 | 1 | 8 | 9 | 1 | 9 | 29 |
| 1912 | 0 | 17 | 63 | 1 | 6 | 32 | 1 | 9 | 64 |
| 1913 | 0 | 7 | 78 | 0 | 10 | 19 | 0 | 14 | 90 |
| 1914 | 0 | 10 | 75 | 0 | 8 | 106 | 0 | 16 | 69 |
| 1915 | 1 | 18 | 68 | 2 | 9 | 9 | 2 | 4 | 71 |
| Means | 1 | 8 | 2 | 1 | 16 | 4 | 1 | 17 | 102 |
| Mean hay yield | 1 | 14 | 19 | 2 | 3 | 106 | 2 | 6 | 26 |

The points brought out by these tables, which cover an eleven-year period, are:—

1. The increase in crop which may be expected in average years from the use of 1cwt. of superphosphate is 4bush. 38lbs. of grain or 9cwt. 87lbs. of hay per acre.
2. The corresponding increases which may be counted on in normal years when 2cwts. of the same fertiliser are applied are 5bush. 38lbs. of grain, or 12cwt. 7lbs. of hay per acre.
3. The extra yield to be anticipated in average seasons from the addition of the second cwt. of superphosphate is 1bush. of grain or 2cwt. 32lbs. of hay per acre.

In the succeeding tables the values of these increases, calculated at normal rates are shown, as also are the net values after deducting 4s. 6d. per cwt. of manure from the gross values.

TABLE XII.—*Showing Comparative Values of Differences in Yields.*

(*a*) GRAIN YIELDS.

| | | INCREASE OR DECREASE OVER. | | | | | |
|---|---|---|---|---|---|---|---|
| | | No Manure. | | | 1cwt. Superphosphate. | | |
| Superphosphate. | Mean Yields. 1905-1915. Bush. lbs. | Grain per Acre. Bush. lbs. | Value at 3/6 per Bush. | Net Value Allowing 4/6 per cwt. of Manure. | Grain per Acre. Bush. lbs. | Value at 3/6 Bushel. | Net Value Allowing 4/6 per cwt. of Manure. |
| No manure.. | 15 37 | — | — | — | — | — | — |
| 1cwt. ...... | 20 15 | 4 38 | 16/3 | 11/9 | — | — | — |
| 2cwts....... | 21 15 | 5 38 | 19/9 | 10/9 | 1 0 | 3/6 | -1/- |

TABLE XII. *Showing Comparative Values of Differences in Yields*—continued.

(*b*) TOTAL PRODUCE AND HAY YIELDS.

| Superphosphate. | Mean Yields Total Produce 1905–1915. | | | Calculated Mean Hay Yields. 1905–1915. | | | No Manure. Hay Per Acre. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Tons. | cwts. | lbs. | Tons. | cwts. | lbs. | Tons | cwts. | lbs. |
| No manure ........ | 1 | 8 | 2 | 1 | 14 | 19 | | — | |
| 1cwt. ............. | 1 | 16 | 4 | 2 | 3 | 106 | 0 | 9 | 87 |
| 2cwts. ............ | 1 | 17 | 102 | 2 | 6 | 26 | 0 | 12 | 7 |

INCREASE OR DECREASE OVER.

| Superphosphate. | No Manure. Value at 35/- ton. | | No Manure. Net Value Allowing 4/6 cwt. of Super. | | 1cwt. Superphosphate. Hay Per Acre. | | | 1cwt. Superphosphate. Value at 35/- ton. | | 1cwt. Superphosphate. Net Value Allowing 4/6 cwt. of Super. | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | *s.* | *d.* | *s.* | *d.* | T. | C. | L. | *s.* | *d.* | *s.* | *d.* |
| No manure ........ | — | | — | | | — | | — | | — | |
| 1cwt. ............. | 17 | 1 | 12 | 7 | | — | | — | | — | |
| 2cwts. ............ | 21 | 1 | 12 | 1 | 0 | 2 | 32 | 4 | 0 | -0 | 6 |

In connection with the above tables, it should be noted that the term "net value" is not used in the sense of net profit. In order to arrive at a true net profit, allowance would have to be made for the additional expense entailed in garnering and marketing the extra crop. The figures, however, enable comparisons to be made on a monetary basis, and it will be patent to all that from this point of view the practice of using 1cwt. of superphosphate for wheat crops is a truly economic one. In the matter of grain, the extra return is worth 16s. 3d., which leaves a credit balance of 11s. 9d. per acre after defraying the cost of manure. With hay crops in this district the 1cwt. dressing gives on the average an increase on the net value of 12s. 7d. per acre.

Judged on the crop returns alone, the practice of applying a second cwt. of superphosphate to wheat crops in the bare fallow-wheat rotation is an unprofitable one. Calculating on the same basis as before, we find that the system results in a debit balance of 1s. in grain crops and 6d. in hay crops.

We have, therefore, to record, as the result of 11 years' work, that on the clay loams in this district the second cwt. of superphosphate per acre applied to wheat grown in alternate years with bare fallow is not directly profit-bearing in an average season.

### 2. *Influence of Rainfall on Effect of Superphosphate on Wheat.*

It has been known for many years that the application of mineral manures to wheat crops help to assist them through the dry periods, and enables them to ripen their grain under a lower rainfall than would be possible otherwise. From certain experiments conducted by Marie Davy, it has been inferred that land dressed with mineral fertilisers would produce good wheat on approximately 33 per cent. less rainfall than unmanured land. This bears out the general experience that dry seasons are more likely to bring out sharply the differences between the fertilising effects of artificial manures than wet seasons. A heavy rainfall enables the crop to make fuller use of the mineral nutrients in the soil, and thus masks the influence of readily available fertilisers.

Whereas a dry season favors the crop which is developing under the "stimulus" of a water-soluble phosphate, in wet years the ripening period is delayed, and the slower-growing crop on the unmanured plot profits by the protraction of the season in a greater degree than the fertilised crop.

Figures indicating our experience in connection with this subject are subjoined.

Table XIII.—*Showing Average Percentage Increases of Wheat Treated with 2cwts. of Superphosphate over Unmanured Wheat, Grown on Bare Fallow—Wheat Rotation,* 1905-1915.

| | 2cwts Superphosphate. | |
|---|---|---|
| | Grain. Per cent. | Hay. Per cent. |
| Seasons much above average— | | |
| 1908<br>1909<br>1905<br>1915 | + 28·29 | + 33·76 |
| Seasons normal— | | |
| 1910<br>1906 | + 20·66 | + 23·79 |
| Seasons below average— | | |
| 1912<br>1911<br>1907 | + 52·45 | + 43·50 |
| Seasons very much below average— | | |
| 1913<br>1914 | + 113·81 | + 71·11 |

It will be noticed that the number of years included under the four classes of seasons is limited, nevertheless they go to show that both in grain and hay yield the increase over the check plot yield is very much greater in the very dry years than when the rainfall was above the average.

That the vegetative period is shortened by the use of superphosphate is clearly indicated in the following table of observations on the duration of the different stages in crop development.

TABLE XIV.—*Showing Number of Days Elapsing between Characteristic Periods of Vegetation of Unmanured Wheat and of Wheat Dressed with Superphosphate. Plots* 26 *and* 27.

| Year. | No. of Days Between Germination and Full Bloom. | | No. of Days Between Full Bloom and Ripening. | | No. of Days Between Germination and Ripening. | |
|---|---|---|---|---|---|---|
| | No Manure. | Superphosphate. | No Manure. | Superphosphate. | No Manure. | Superphosphate. |
| | No. of Days. | No. of Days. | No. of Days. | No. of Days. | No. of Days. | No. of Days. |
| 1906 .. | 137 | 136 | 53 | 52 | 190 | 188 |
| 1907 .. | 132 | 128 | 52 | 55 | 184 | 183 |
| 1908 .. | 127 | 123 | 36 | 35 | 163 | 158 |
| 1909 .. | 139 | 137 | 43 | 46 | 182 | 183 |
| 1910 .. | 129 | 125 | 52 | 54 | 181 | 179 |
| 1911 .. | 126 | 121 | 46 | 47 | 172 | 168 |
| 1912 .. | 114 | 109 | 45 | 42 | 159 | 151 |
| 1913 .. | 89 | 80 | 38 | 44 | 127 | 124 |
| 1914 .. | 104 | 102 | 48 | 38 | 152 | 140 |
| 1915 .. | 123 | 119 | 47 | 43 | 170 | 162 |
| Means. | 122 | 118 | 46 | 46 | 168 | 164 |

Thus we see that during the last 10 years there has been a mean difference of four days between germination and ripening in manured and unmanured crops. The whole of this difference occurs in the period between germination and flowering; the unmanured wheat ripening off quite as rapidly as the manured when once the blooming stage has been reached.

### 8. *Direct Effects of Superphosphate Used in the Bare Fallow, Wheat, Pasture Rotation.*

The application of superphosphate under a three-course rotation has been tested in four sets of plots, receiving ½cwt., 1cwt., 2cwts., and 3cwts. per acre respectively, when under wheat. The pasturage on these plots has varied from time to time. At the commencement of the experiment, it consisted of spontaneous herbage, but of late years rape has been regularly sown without manure at the rate of 4lbs. of seed per acre.

The high prices that stock are bringing and are likely to command for some time to come will incline farmers towards this rotation, which admits of more stock being carried than is possible under the two-course system. For this reason the appended results showing mean yields of grain and hay are of peculiar interest at the present juncture.

TABLE XV.—*Showing Effects of Different Quantities of Superphosphate—36/38 Grade—on Wheat Grown in Rotation with Pasture and Bare Fallow,* 1905-1915.

(*a*) GRAIN YIELDS.

| Years. | Superphosphate. | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ½cwt. | | 1cwt. | | 2cwts. | | 3cwts. | |
| | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. |
| 1905 | 28 | 53 | 29 | 19 | 30 | 51 | 28 | 52 |
| 1906 | 19 | 14 | 17 | 46 | 20 | 4 | 22 | 57 |
| 1907 | 16 | 24 | 14 | 22 | 13 | 21 | 12 | 5 |
| 1908 | 27 | 32 | 29 | 1 | 31 | 25 | 32 | 53 |
| 1909 | 25 | 48 | 26 | 37 | 27 | 33 | 29 | 38 |
| 1910 | 18 | 42 | 19 | 2 | 20 | 18 | 17 | 39 |
| 1911 | 17 | 24 | 17 | 51 | 21 | 47 | 22 | 43 |
| 1912 | 18 | 58 | 20 | 54 | 22 | 10 | 19 | 52 |
| 1913 | 7 | 11 | 6 | 8 | 5 | 29 | 5 | 43 |
| 1914 | 6 | 41 | 8 | 20 | 11 | 11 | 10 | 8 |
| 1915 | 23 | 5 | 23 | 3 | 24 | 55 | 25 | 16 |
| Means | 19 | 5 | 19 | 18 | 20 | 49 | 20 | 42 |

(*b*) TOTAL PRODUCE AND HAY YIELDS.

| Years. | Superphosphate | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ½cwt. | | | 1cwt. | | | 2cwts. | | | 3cwts. | | |
| | T. | C. | L. | T. | C. | L. | T. | C. | L. | T. | C. | L. |
| 1905 | 2 | 14 | 88 | 2 | 17 | 4 | 2 | 15 | 22 | 2 | 18 | 104 |
| 1906 | 2 | 6 | 3 | 1 | 17 | 46 | 2 | 2 | 7 | 2 | 4 | 18 |
| 1907 | 1 | 3 | 21 | 1 | 0 | 27 | 0 | 19 | 77 | 0 | 18 | 12 |
| 1908 | 2 | 7 | 50 | 2 | 11 | 55 | 2 | 12 | 71 | 2 | 14 | 74 |
| 1909 | 2 | 8 | 46 | 2 | 10 | 56 | 2 | 11 | 70 | 2 | 19 | 74 |
| 1910 | 2 | 7 | 24 | 2 | 10 | 71 | 2 | 10 | 80 | 2 | 2 | 15 |
| 1911 | 1 | 17 | 3 | 1 | 17 | 69 | 2 | 1 | 73 | 2 | 0 | 90 |
| 1912 | 1 | 9 | 68 | 1 | 11 | 93 | 1 | 13 | 5 | 1 | 10 | 102 |
| 1913 | 0 | 13 | 39 | 0 | 11 | 48 | 0 | 11 | 24 | 0 | 7 | 12 |
| 1914 | 0 | 7 | 55 | 0 | 11 | 37 | 0 | 15 | 110 | 0 | 12 | 89 |
| 1915 | 2 | 4 | 85 | 2 | 3 | 18 | 2 | 5 | 44 | 2 | 6 | 96 |
| Means | 1 | 16 | 34 | 1 | 16 | 68 | 1 | 18 | 12 | 1 | 17 | 93 |
| Mean hay yields | 2 | 4 | 31 | 2 | 4 | 72 | 2 | 6 | 53 | 2 | 6 | 15 |

A glance at the above tables will show that there has been on the average of seasons a steady increase in yield up to the 2cwt. plot, whereas the mean returns show a slight decline as the result of the addition of the third cwt. of manure. This remark applies to grain and hay alike.

The plots may be conveniently compared one with another by reference to the next two tables, which indicate differences in yields, together with the gross and net values of the same.

TABLE XVI.—*Showing Comparative Values of Differences in Yields.*

(*a*) GRAIN YIELDS.

INCREASE OVER OR DECREASE BELOW.

| Superphosphate. | Mean Yields, 1905-1915 | ½cwt. | | | 1cwt. | | |
|---|---|---|---|---|---|---|---|
| | | Grain per Acre. | Value at 3s. 6d. per Bush. | Net Value, Allowing 4s. 6d. per Cwt. Super. | Grain per Acre. | Value at 3s. 6d. per Bush. | Net Value, Allowing 4s. 6d. per Cwt. Super. |
| | Bush. lbs. | Bush. lbs. | *s. d.* | *s. d.* | Bush. lbs. | *s. d.* | *s. d.* |
| ½cwt. | 19 5 | — | — | — | — | — | — |
| 1cwt. | 19 18 | 0 13 | 0 9 | − 1 6 | — | — | — |
| 2cwts. | 20 49 | 1 44 | 6 1 | − 0 8 | 1 31 | 5 4 | 0 10 |
| 3cwts. | 20 42 | 1 37 | 5 8 | − 5 7 | 1 24 | 4 11 | − 4 1 |

| Superphosphate. | Mean Yields, 1905-1915. | 2cwts. | | |
|---|---|---|---|---|
| | | Grain per Acre. | Value at 3s. 6d. per Bush. | Net Value, Allowing 4s. 6d. per Cwt. Super. |
| | Bush. lbs. | Bush. lbs. | *s. d.* | *s. d.* |
| ½cwt. | 19 5 | — | — | — |
| 1cwt. | 19 18 | — | — | — |
| 2cwts. | 20 49 | — | — | — |
| 3cwts. | 20 42 | − 0 7 | − 0 5 | − 4 11 |

(*b*) HAY YIELDS.

INCREASE OVER OR DECREASE BELOW.

| Superphosphate. | Mean Yields. Total Produce, 1905–15. | Calculated Mean Hay Yields, 1905–15. | ½cwt. | | | 1cwt. | | |
|---|---|---|---|---|---|---|---|---|
| | | | Hay per Acre | Value at 35s. per Ton. | Net Value, Allowing 4s. 6d. Cwt Super. | Hay per Acre. | Value at 35s. per Ton. | Net Value, Allowing 4s. 6d. Cwt. Super. |
| | T. C. L. | T. C. L. | C. L. | *s. d.* | *s. d.* | C. L. | *s. d.* | *s. d.* |
| ½cwt. | 1 16 34 | 2 4 31 | — | — | — | — | — | — |
| 1cwt. | 1 16 68 | 2 4 72 | 0 41 | 0 8 | − 1 7 | — | — | — |
| 2cwts. | 1 18 12 | 2 6 53 | 2 22 | 3 10 | − 2 11 | 1 93 | 3 2 | − 1 4 |
| 3cwts. | 1 17 93 | 2 6 15 | 1 96 | 3 3 | − 8 0 | 1 55 | 2 7 | − 6 5 |

| Superphosphate. | Mean Yields, Total Produce, 1905–15. | Calculated Mean Hay Yields, 1905–15. | 2cwts. | | |
|---|---|---|---|---|---|
| | | | Hay per Acre. | Value at 35s. per Ton. | Net Value, Allowing 4s. 6d. Cwt. Super. |
| | T. C. L. | T. C. L. | C. L. | *s. d.* | *s. d.* |
| ½cwt | 1 16 34 | 2 4 31 | — | — | — |
| 1cwt. | 1 16 68 | 2 4 72 | — | — | — |
| 2cwts. | 1 18 12 | 2 6 53 | — | — | — |
| 3cwts. | 1 17 93 | 2 6 15 | − 0 38 | − 0 7 | − 5 1 |

The first point that calls for notice is the relatively small increase in hay as well as in grain from the application of the second ½cwt. of manure. The extra yield is so slight that the heavier manuring is seen to involve a net loss of 1s. 6d. per acre. The 2cwt. dressing has given the most satisfactory returns in grain, but in the matter of hay it does not appear to advantage when compared with either of the lighter dressed plots. Thus it has resulted in a net loss of 2s. 11d. per acre as compared with the ½cwt. plot, and 1s. 4d. per acre compared with the 1cwt. dressing.

In not one instance has the use of a third cwt. of superphosphate been profit bearing—in fact, the net loss entailed has varied from 4s. 1d. to 5s. 7d. in grain crops, and 5s. 1d. to 8s. per acre in hay crops. These figures are not calculated to inspire confidence in the policy of heavy manuring, but in a three-course system the manure returns part of its value in the form of grazing, and consequently it is not correct to gauge the value of the fertilising effects of superphosphate solely by the increased crop returns.

A similarly designed experiment was started in Grainger's C in 1910 on land that had not been previously manured. The opportunity was seized of including a check plot receiving no manure at all. The grain and hay yields derived from these plots are given below.

TABLE XVII.—*Showing Effects of Different Quantities of Superphosphate 36/38 Grade—on Wheat Grown in Rotation with Pasture and Bare Fallow on Land not Previously Dressed with Manure,* 1910-15.

(*a*) GRAIN YIELDS.

| Years. | No Manure. | | ½cwt. Super. | | 1cwt. Super. | | 2cwts. Super. | | 3cwts. Super. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. | Bush. | lb |
| 1910 | 15 | 25 | 21 | 43 | 22 | 44 | 22 | 15 | 22 | 13 |
| 1911 | — | | — | | — | | — | | — | |
| 1912 | 5 | 38 | 13 | 11 | 17 | 23 | 16 | 43 | 19 | 18 |
| 1913 | 2 | 26 | 4 | 49 | 5 | 47 | 6 | 14 | 5 | 26 |
| 1914 | 7 | 18 | 15 | 30 | 11 | 43 | 11 | 50 | 9 | 36 |
| 1915 | — | | — | | — | | — | | — | |
| Means | 7 | 42 | 13 | 48 | 14 | 24 | 14 | 15 | 14 | 8 |

(*b*) TOTAL PRODUCE AND HAY YIELDS.

| Years. | No Manure. | | | ½cwt. | | | 1cwt. | | | 2cwts. | | | 3cwts. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | T. | C. | L. | T. | C. | L. | T. | C. | L. | T. | C. | L. | T. | C. | L. |
| 1910 | 1 | 7 | 47 | 1 | 13 | 13 | 1 | 18 | 38 | 2 | 0 | 61 | 2 | 0 | 64 |
| 1911 | 1 | 2 | 77 | 1 | 7 | 49 | 1 | 12 | 50 | 1 | 13 | 49 | 1 | 14 | 71 |
| 1912 | 0 | 12 | 28 | 1 | 3 | 13 | 1 | 10 | 63 | 1 | 8 | 109 | 1 | 12 | 58 |
| 1913 | 0 | 5 | 78 | 0 | 8 | 97 | 0 | 11 | 98 | 0 | 12 | 82 | 0 | 14 | 45 |
| 1914 | 0 | 9 | 74 | 1 | 1 | 98 | 0 | 16 | 98 | 1 | 0 | 51 | 0 | 15 | 22 |
| 1915 | 0 | 14 | 98 | 1 | 5 | 23 | 1 | 16 | 39 | 1 | 12 | 27 | 1 | 12 | 31 |
| Means | 0 | 15 | 48 | 1 | 3 | 30 | 1 | 7 | 83 | 1 | 8 | 7 | 1 | 8 | 30 |
| Mean hay yield | 0 | 18 | 91 | 1 | 8 | 42 | 1 | 13 | 93 | 1 | 14 | 25 | 1 | 14 | 53 |

The inclusion of an unmanured plot in this series enables us to measure the wonderful effect of the first ½cwt. of manure and at the same time to contrast this result with the comparatively small increments due to additional quantities. For instance, we note an increase of 6bush. 6lbs. of grain and 9cwt. 63lbs. of hay per acre from a ½cwt.

dressing whilst the maximum increase in grain yield attributable to further additions is 36lbs. per acre from the 1cwt. plot. In the mean hay returns it will be observed that the second ½cwt. has again given the largest increase over and above that obtained from the ½cwt. dressing. In this instance, an increase of 5cwt. 51lbs. per acre is recorded, whereas the 2cwt. and 3cwt. applications have returned relatively small corresponding increases, namely, 44lbs. and 28lbs. of hay per acre respectively.

We will now consider these differences in terms of monetary value.

TABLE XVIII.—*Showing Comparative Values of Differences in Yields.*

(*a*) GRAIN YIELD.

INCREASE OVER OR DECREASE BELOW.

| | | | No Manure. | | | | ½cwt. | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Superphosphate. | Mean Yield per Acre. | | Yield per Acre. | | Value at 3/6 per perBush. | Net Value Allowing 4/6 per cwt. Super. | Yield per Acre. | | Value at 3/6 per Bush. | Net Value Allowing 4/6 per cwt.Super. |
| | Bush. | lbs. | Bush. | lbs. | *s. d.* | *s. d.* | Bush. | lbs. | *s. d.* | *s. d.* |
| No manure ..... | 7 | 42 | — | | — | — | — | | — | — |
| ½cwt. ........... | 13 | 48 | 6 | 6 | 21/4 | 19/1 | — | | — | — |
| 1cwt. ........... | 14 | 24 | 6 | 42 | 23/5 | 18/11 | 0 | 36 | 2/1 | –/2 |
| 2cwts. ........... | 14 | 15 | 6 | 33 | 22/11 | 13/11 | 0 | 27 | 1/7 | –5/2 |
| 3cwts. ........... | 14 | 8 | 6 | 26 | 22/6 | 9/- | 0 | 20 | 1/2 | –10/1 |

INCREASE OVER OR DECREASE BELOW.

| | | | 1cwt. | | | | 2cwts. | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Superphosphate. | Mean Yield per Acre. | | Yield per Acre. | | Value at 3/6 per Bushel. | Net Value Allowing 4/6 per cwt.Super. | Yield per Acre. | | Value at 3/6 per Bushel. | Net Value Allowing 4/6 per cwt. Super. |
| | Bush. | lbs. | Bush. | lbs. | *s. d.* | *s. d.* | Bush. | lbs. | *s. d.* | *s. d.* |
| No manure ..... | 7 | 42 | — | | — | — | — | | — | — |
| ½cwt. ........... | 13 | 48 | — | | — | — | — | | — | — |
| 1cwt. ........... | 14 | 24 | — | | — | — | — | | — | — |
| 2cwts. ........... | 14 | 15 | –0 | 9 | –/6 | –5/– | — | | — | — |
| 3cwts. ........... | 14 | 8 | –0 | 16 | –/11 | –9/11 | –/7 | | –/5 | –4/11 |

(*b*) HAY YIELDS.

INCREASE OVER OR DECREASE BELOW.

| | | | No Manure. | | | ½cwt. | | |
|---|---|---|---|---|---|---|---|---|
| Superphosphate. | Mean Yield Total Produce. 1910-15. | Calculated Mean Hay Yields. 1910-15. | Hay Per Acre. | Value at 35/- Per Ton. | Net Profit Allowing 4/6 Per Cwt. Super. | Hay Per Acre. | Value at 35/- Per Ton. | Net Profit Allowing 4/6 Per Cwt. Super. |
| | T. C. L. | T. C. L. | T. C. L. | *s. d.* | *s. d.* | T. C. L. | *s. d.* | *s. d.* |
| No manure | 0 15 48 | 0 18 91 | — | — | — | — | — | — |
| ½cwt. ..... | 1 3 30 | 1 8 42 | 0 9 63 | 16 9 | 14 6 | — | — | — |
| 1cwt. ..... | 1 7 83 | 1 13 93 | 0 15 2 | 26 3 | 21 9 | 0 5 51 | 9 7 | 7 4 |
| 2cwts. .... | 1 8 7 | 1 14 25 | 0 15 46 | 27 0 | 18 0 | 0 5 95 | 10 3 | 3 6 |
| 3cwts. .... | 1 8 30 | 1 14 53 | 0 15 74 | 27 5 | 13 11 | 0 6 11 | 10 8 | –0 7 |

TABLE XVIII.—*Showing Comparative Values of Differences in Yields.*—continued.

(*b*) HAY YIELDS—*continued.*

| | | | INCREASE OVER OR DECREASE BELOW. | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 1cwt. | | | 2cwts. | | |
| Superphosphate. | Mean Yield Total Produce. 1910-15. | Calculated Mean Hay Yields. 1910-15. | Hay Per Acre. | Value at 35/- Per Ton. | Net Profit Allowing 4/6 Per Cwt. Super. | Hay Per Acre. | Value at 35/- Per Ton. | Net Profit Allowing 4/6 Per Cwt. Super. |
| | T. C. L. | T. C. L. | T. C. L. | *s.* *d.* | *s.* *d.* | T. C. L. | *s.* *d.* | *s.* *d.* |
| No manure. | 0 15 48 | 0 18 91 | — | — | — | — | — | — |
| ½cwt. ..... | 1 3 30 | 1 8 42 | — | — | — | — | — | — |
| 1cwt. ..... | 1 7 83 | 1 13 93 | — | — | — | — | — | — |
| 2cwts. ..... | 1 8 7 | 1 14 25 | 0 0 44 | 8 | −3 10 | — | — | — |
| 3cwts. .... | 1 8 30 | 1 14 53 | 0 0 72 | 1 1 | −7 11 | 0 0 28 | 0 5 | −4 1 |

The computations in the above tables have been made on the same market values as in the foregoing calculations of a similar character.

Regarding the yield of grain, it should be pointed out that the mean figures represent the average return over four seasons, a period altogether too brief for an investigation of this character. It will be recalled that in the corresponding plot in Field No. 4 the best grain yield was secured from 2cwt. of superphosphate. In this instance, however, the use of a similar quantity of fertiliser is seen to result in a "net loss" of 5s. 2d per acre as compared with the application of ½cwt.

Up to the present time, the ½cwt. plot has proved the most profitable, but the difference between the net profit from it and that from the 1cwt. plot is virtually negligible, and is quite conceivable in the light of our experience in No. 4 that in the course of time the use of 1cwt. or more of superphosphate per acre will prove to be more profitable even with regard to crop production than the lighter quantity. The use of 3cwt. of superphosphate for wheat crops is contra indicated here to an even greater degree than it was on Table XVI.

Turning to the hay values, it will be noticed that the highest net profit has been derived from the 1cwt. plot, which shows an additional net profit of 7s. 4d. per acre over the ½cwt. plot, and is 3s. 10d. per acre better than the 2cwt. plot. The hay yields shown are the means of six seasons, and the results conform closely to preconceived ideas.

Reviewing these results from Fields No. 4 and Grainger's C broadly, we are impelled to the conclusion that from the point of view of crop production the most satisfactory manurial dressing for wheat or wheaten hay crops on a three-course system in this district is in the region of 1cwt. per acre of superphosphate. This statement is made without reference to the secondary effects of the manure on the quality and amount of pasturage produced during the 18 months the land is available for grazing.

### 4. *The Grazing Value of Land Worked Under Bare Fallow, Wheat, Pasture Rotation and Manured with Different Quantities of Superphosphate.*

It has always been contended by the advocates of heavy manuring that the residual effects of the excess quantity would more than repay the extra cost by its influence on the nutritive value and stock-carrying capacity of the natural herbage or forage crops sown on the stubbles. This was regarded as a complete rejoinder to those who stood for the application of superphosphate in quantities no more than adequate for the production of full crops of hay or grain. The gradual increase in importance of farm livestock has emphasised the need for thoroughly investigating this question in field plots, and with this purpose in view our predecessors had the No. 4 and Grainger's C three-course plots fenced off, so that the relative grazing values might be carefully compared.

The No. 4 plots were partially fenced off in 1906, but as complete results were not available till 1909, the grazing records for the intervening period have been excluded from the appended tables.

TABLE XIX.—*Showing Influence of Heavy and Light Dressings of Superphosphate on Sheep-carrying Capacity of Land.*

| Year. | Stubble Grazing. Jan.-March. | Grazing Year. April-March. | Grazing before Fallowing April-June. | Total Grazing. | Sheep per Acre over whole Area under Rotation Sheep per Acre per Annum. |
|---|---|---|---|---|---|
| | EQUIVALENT NUMBER OF SHEEP PER ACRE PER ANNUM. | | | | |
| | | *½cwt. Plots.* | | | |
| 1909 ......... | 0·25 | 1·92 | 0·37 | 2·54 | 0·85 |
| 1910 ......... | 0·15 | 1·19 | 1·22 | 2·56 | 0·85 |
| 1911 ......... | 0·57 | 0·97 | 0·56 | 2·10 | 0·70 |
| 1912 ......... | 0·56 | 1·50 | 0·00 | 2·06 | 0·69 |
| 1913 ......... | 0·20 | 0·68 | 0·00 | 0·88 | 0·29 |
| 1914 ......... | 0·62 | 0·62 | 0·13 | 1·37 | 0·46 |
| 1915 ......... | 1·83 | 3·39 | 0·50 | 5·72 | 1·91 |
| Means 1909-15 | 0·60 | 1·47 | 0·40 | 2·46 | 0·82 |
| | Value of grazing at 15s. per sheep per annum—£1 16s. 11d. | | | | |
| | | *1cwt. Plots.* | | | |
| 1909 ......... | 0·21 | 1·99 | 0·51 | 2·71 | 0·90 |
| 1910 ......... | 0·14 | 1·20 | 1·22 | 2·56 | 0·85 |
| 1911 ......... | 0·66 | 1·11 | 0·57 | 2·34 | 0·78 |
| 1912 ......... | 0·76 | 1·68 | 0·00 | 2·44 | 0·81 |
| 1913 ......... | 0·23 | 0·60 | 0·00 | 0·83 | 0·28 |
| 1914 ......... | 0·38 | 0·53 | 0·25 | 1·16 | 0·39 |
| 1915 ......... | 2·29 | 4·64 | 0·90 | 7·83 | 2·61 |
| Means 1909-15 | 0·67 | 1·68 | 0·49 | 2·84 | 0·95 |
| | Value of grazing at 15s. per sheep per annum—£2 2s. 7s. | | | | |

**Table XIX.**—*Showing Influence of Heavy and Light Dressings*—contd.

| Year. | Stubble Grazing Jan.-March. | Grazing Year. April-March. | Grazing before Fallowing. April-June. | Total Grazing. | Sheep per Acre over whole Area under Rotation. Sheep per Acre per Annum. |
|---|---|---|---|---|---|
| | EQUIVALENT NUMBER OF SHEEP PER ACRE PER ANNUM. | | | | |
| | | *2cwt. Plots.* | | | |
| 1909 ......... | 0·27 | 2·38 | 0·61 | 3·26 | 1·09 |
| 1910 ......... | 0·13 | 1·19 | 1·21 | 2·53 | 0·84 |
| 1911 ......... | 0·75 | 1·12 | 0·66 | 2·53 | 0·84 |
| 1912 ......... | 0·68 | 1·87 | 0·00 | 2·55 | 0·85 |
| 1913 ......... | 0·20 | 0·69 | 0·00 | 0·89 | 0·30 |
| 1914 ......... | 0·55 | 1·05 | 0·28 | 1·88 | 0·63 |
| 1915 ......... | 2·39 | 4·42 | 1·55 | 8·36 | 2·79 |
| Means 1909-15 | 0·71 | 1·82 | 0·62 | 3·14 | 1·05 |
| | Value of grazing at 15s. per sheep per annum—£2 7s. 1d. | | | | |
| | | *3cwt. Plots.* | | | |
| 1909 ......... | 0·27 | 2·49 | 0·63 | 3·39 | 1·13 |
| 1910 ......... | 0·14 | 1·32 | 1·23 | 2·69 | 0·90 |
| 1911 ......... | 0·82 | 1·38 | 0·68 | 2·88 | 0·96 |
| 1912 ......... | 0·89 | 1·87 | 0·00 | 2·76 | 0·92 |
| 1913 ......... | 0·20 | 0·79 | 0·00 | 0·99 | 0·33 |
| 1914 ......... | 0·45 | 0·79 | 0·19 | 1·43 | 0·48 |
| 1915 ......... | 2·48 | 4·49 | 1·37 | 8·34 | 2·78 |
| Means 1909-15 | 0·75 | 1·88 | 0·59 | 3·21 | 1·07 |
| | Value of grazing at 15s. per sheep per annum—£2 8s. 2d. | | | | |

The total grazing figures given above represent the sum of the average number of sheep carried per acre per annum on the wheat stubble, on the rape crop, and on the rape stubble immediately prior to fallowing. This covers a period of approximately 18 months, that is to say that under the scheme of rotation there is available in any one year the equivalent of a year and a half's grazing on a single plot. The figures given under total grazing will, therefore, indicate the total number of sheep carried on a per acre per annum basis over the grazed area of each series of three plots, and consequently the sheep-carrying capacity of the whole area of the series will be represented by one-third of the "total grazing," as shown in the final columns of the above tables.

This implies that the grazing capacity of a farm worked under the above rotation, when expressed on terms of the whole acreage, is 0.82, 0.95, 1.05, and 1.07 sheep per acre per annum, according as the wheat crop is manured with ½cwt., 1cwt., 2cwts., or 3cwts. of superphosphate per acre.

The results now submitted cover a period of seven years, and it is noteworthy that the grazing capacity gradually rises as the manurial dressing is increased. The year 1914 had a depressing effect on the average figures, but this was more than counterbalanced by the luxuriant grazing provided in 1915. The rape crop in 1915 carried the equivalent of 3.39 sheep per acre per annum on the ½cwt. group, and 4.64 on the 1cwt. series. The "total grazing" figures for last year were even more remarkable, ranging from 5.72 on the ½cwt. to 8.36 sheep per acre per annum on the 2cwt. plot.

The mean "total grazing" figures will form the basis of comparison in a subsequent table, and it will suffice for the present to draw attention to the money equivalents shown above for each series of plots.

The corresponding plots in Grainger's C date back to 1911, hence the grazing returns now submitted cover a period of five (5) years.

**Table XX.**—*Showing Influence of Heavy and Light Dressings of Superphosphate on Sheep-carrying Capacity of Land.*

GRAINGER'S MANURE PLOTS.

| Year. | Stubble Grazing. | Fodder Crop. | Autumn Pasture. | Total Grazing. | Sheep Per Acre Per Annum. |
|---|---|---|---|---|---|
| *No Manure.* | | | | | |
| 1911 | 0·54 | 0·46 | 0·00 | 1·00 | 0·33 |
| 1912 | 0·27 | 0·50 | 0·00 | 0·77 | 0·26 |
| 1913 | 0·37 | 0·21 | 0·00 | 0·58 | 0·19 |
| 1914 | 0·37 | 0·28 | 0·00 | 0·65 | 0·22 |
| 1915 | 1·22 | 2·16 | 0·42 | 3·80 | 1·27 |
| Means 1911-15 | 0·55 | 0·72 | 0·08 | 1·36 | 0·45 |
| Value of grazing at 15s. per acre per annum—£1 0s. 5d. | | | | | |
| ½cwt. | | | | | |
| 1911 | 0·68 | 0·56 | 0·00 | 1·24 | 0·41 |
| 1912 | 0·41 | 0·71 | 0·00 | 1·12 | 0·37 |
| 1913 | 0·43 | 0·29 | 0·00 | 0·72 | 0·24 |
| 1914 | 0·81 | 0·36 | 0·00 | 1·17 | 0·39 |
| 1915 | 1·40 | 3·28 | 0·66 | 5·34 | 1·78 |
| Means 1911-15 | 0·75 | 1·04 | 0·13 | 1·92 | 0·64 |
| Value of grazing at 15s. per acre per annum—£1 8s. 10d. | | | | | |
| 1cwt. | | | | | |
| 1911 | 0·82 | 0·67 | 0·00 | 1·49 | 0·50 |
| 1912 | 0·54 | 0·92 | 0·00 | 1·46 | 0·49 |
| 1913 | 0·46 | 0·40 | 0·00 | 0·86 | 0·29 |
| 1914 | 0·68 | 0·45 | 0·00 | 1·13 | 0·38 |
| 1915 | 1·37 | 4·09 | 0·82 | 6·28 | 2·09 |
| Means 1911-15 | 0·77 | 1·31 | 0·16 | 2·24 | 0·75 |
| Value of grazing at 15s. per acre per annum—£1 13s. 7d. | | | | | |
| 2cwts. | | | | | |
| 1911 | 0·96 | 0·86 | 0·00 | 1·82 | 0·61 |
| 1912 | 0·68 | 1·12 | 0·00 | 1·80 | 0·60 |
| 1913 | 0·50 | 0·50 | 0·00 | 1·00 | 0·33 |
| 1914 | 0·75 | 0·45 | 0·00 | 1·20 | 0·40 |
| 1915 | 1·92 | 4·49 | 1·00 | 7·41 | 2·47 |
| Means 1911-15 | 0·96 | 1·48 | 0·20 | 2·65 | 0·88 |
| Value of grazing at 15s. per acre per annum—£1 19s. 9d. | | | | | |
| 3cwts. | | | | | |
| 1911 | 1·07 | 0·79 | 0·00 | 1·86 | 0·62 |
| 1912 | 0·64 | 1·62 | 0·00 | 2·26 | 0·75 |
| 1913 | 0·59 | 0·67 | 0·00 | 1·26 | 0·42 |
| 1914 | 0·43 | 0·69 | 0·00 | 1·12 | 0·37 |
| 1915 | 1·82 | 2·59 | 1·11 | 5·52 | 1·84 |
| Means 1911-15 | 0·91 | 1·27 | 0·22 | 2·40 | 0·80 |
| Value of grazing at 15s. per acre per annum—£1 16s. | | | | | |

The main difference between these results and those previously discussed is the slight falling away in grazing value of the 3cwt. plot, which has carried on an average over the five seasons a quarter of a sheep per acre per annum less than the 2cwt. plot. The discrepancy is not large, and may disappear later on as the manurial residues accumulate. It would not be inconsistent with our general experience to find that the 2cwt. and 3cwt. plots remained approximately equal in respect of total grazing for a number of years, as these plots occupy land that has not previously received superphosphate, and it may take a number of years, even 10 or 12, before marked differences in favor of the heavier dressing become apparent. One other point brought out by these plots is the increase of over half a sheep per acre in the annual grazing value of the ½cwt. plot in comparison with the unmanured.

### 5. *The Direct and Indirect Values of Different Quantities of Superphosphate Applied to Wheat Grown in a Bare Fallow, Wheat, Pasture Rotation.*

We are now in a position to combine the cropping and grazing results of these different dressings of superphosphate in a tabular statement, and to compare the money values of the effects they have produced. In the appended table, the relative total values are shown for both the No. 4 and Grainger's C Plots.

TABLE XXI.—*Showing Combined Cropping and Grazing Returns from Both Series of Bare Fallow, Wheat, Pasture Rotations.*

*Field No. 4.*

| Plot. | Average Grain Yield. | | Value at 3s. 6d. per Bushel. | Average Grazing Capacity. | Value at 15s. per Sheep. | Total Cropping and Grazing Values. | Net Combined Values. | Net Profit or Loss after Deducting 4s. 6d. per cwt. for Extra Manure Used. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | No Manure. | ½cwt. | 1cwt. | 2cwts. |
| | Bsh. | lbs. | £ s. d. | Acres. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | s. d. | s. d. | s. d. |
| ½cwt. …… | 19 | 2 | 3 6 7 | 2·46 | 1 16 11 | 5 3 6 | 5 1 3 | — | — | — | — |
| 1cwt. …… | 19 | 18 | 3 7 7 | 2·84 | 2 2 7 | 5 10 2 | 5 5 8 | — | + 4 5 | — | — |
| 2cwts. …… | 20 | 49 | 3 12 10 | 3·14 | 2 7 1 | 5 19 11 | 5 10 11 | — | + 9 8 | +5 3 | — |
| 3cwts. …… | 20 | 42 | 3 12 5 | 3·21 | 2 8 2 | 6 0 7 | 5 7 1 | — | + 5 10 | +1 5 | −3 10 |

*Grainger's Plots.*

| Plot. | Bsh. | lbs. | £ s. d. | Acres. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | s. d. | s. d. | s. d. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No manure | 7 | 42 | 1 6 11 | 1·36 | 1 0 5 | 2 7 4 | 2 7 4 | — | — | — | — |
| ½cwt. …… | 13 | 48 | 2 8 4 | 1·92 | 1 8 10 | 3 17 2 | 3 14 11 | +1 7 7 | — | — | — |
| 1cwt. …… | 14 | 24 | 2 10 5 | 2·24 | 1 13 7 | 4 4 0 | 3 19 6 | +1 12 2 | +4 7 | — | — |
| 2cwts. …… | 14 | 15 | 2 9 10 | 2·65 | 1 19 9 | 4 9 7 | 4 0 7 | +1 13 3 | +5 8 | +1 1 | — |
| 3cwts. …… | 14 | 8 | 2 9 6 | 2·40 | 1 16 0 | 4 5 6 | 3 12 0 | +1 4 8 | −2 11 | −7 6 | −8 7 |

It will be remembered that the maximum amount of superphosphate that can be profitably applied to wheat grown on the bare fallow-wheat rotation was found to be at least 1cwt. and less than 2cwt. per acre. In this case the question of grazing returns did not arise. Similarly, when the value of crop alone was considered on the three-course system, it was found that the limit lay somewhere between 1cwt. and 2cwt., and probably approached closer to the lesser than the greater quantity. When full credit is given to residual effects of the manure, however, we observe that the heavier dressing is amply justified.

In both series of plots, the application of 2cwt. of superphosphate is seen in the above Table of Combined Values to surpass all others in net returns. In the No. 4 experiments it has yielded 9s. 8d. per acre more than the ½cwt., 5s. 3d. more than the 1cwt., and 3s. 10d. in advance of the 3cwt. Similarly, in Grainger's C, the differences in favor of the 2cwt. are £1 13s. 3d., 5s. 8d., 1s. 1d., and 8s. 7d. per acre in respect of the unmanured, ½cwt., 1cwt., and 3cwt. dressings. In this second series, the advantage over the 1cwt. of superphosphate is relatively small, amounting to only 1s. 1d. per acre, whereas in the first group it is nearly five times as great. The explanation of this is that the older plots are profiting by the heavy dressings applied in years gone by, before the land was brought under permanent experiments, whereas in the case of the newer plots, the land had not been manured prior to 1910, and consequently there is no reserve of phosphoric acid to obscure the effects of the different quantities of manure since applied. Reference to the column giving the combined gross returns will bear this out, as it will be noticed that there is a gradual rise from the ½cwt. to the 3cwt. in Field No. 4, whereas in Grainger's C the 3cwt. plot has returned 4s. 1d. less than the 2cwt., and this on account of the fact that sufficient phosphoric acid has not yet accumulated to bring the land into a condition of fertility that experience has shown to be necessary before heavy dressings of superphosphate are able to exert their full influence.

The ultimate result of these inquiries into the effects of different amounts of superphosphate on wheat crops in this district is to fortify us in our general farm practice of applying up to 2cwt. per acre. This is regarded by many as unnecessarily lavish, and possibly the thought is entertained that on economic grounds it could not be justified. It is clear, however, from the above findings, that not only does the 2cwt. pay for itself, but, in addition, it returns annually about half a crown per acre more than any other amount that has been subjected to experimental investigation.

### (c) Basic Slag or Thomas Phosphate.

This is not a water-soluble form of phosphatic fertiliser, but the phosphate it contains is intermediate in solubility between that present in superphosphate and the phosphate of lime present in bonedust. It belongs to the citrate soluble group of phosphatic manures, which is characterised by the fact that the phosphate in them will dissolve out to a large extent when they are brought into contact with weak acids, such as 1 per cent. solution of citric acid. Manures of this type are largely employed in Europe, in districts of heavy rainfall, for top-dressing pastures, and for this purpose they are admirably suited, as they contain, in addition to phosphoric acid, a large amount of lime. In this district, however, the soils are not notably deficient in lime, and since the chief desideratum here is a readily soluble form of phosphoric acid to act as a stimulant to the young wheat crop, it would be contrary to expectations to find basic slag equal in value to corresponding amounts of water soluble phosphatic manures in this district. For the past 10 years there have been conducted at the College field trials with 2cwt. and 3cwt. dressings of basic slag on wheat grown alternately with bare fallow, and we submit below the results of each year's crop, together with the mean returns, and also, for the sake of instituting comparisons, the yields obtained from adjacent plots receiving no manure and 2cwts. of superphosphate per acre.

Table XXII.—*Showing Results of Dressings with Basic Slag*, 1906-15.

| Years. | No Manure. | | 2cwts. Superphosphate. | | 2cwts. Basic Slag. | | 3cwts. Basic Slag. | |
|---|---|---|---|---|---|---|---|---|
| | (a) Grain. | | | | | | | |
| | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. |
| 1906 | 15 | 57 | 20 | 49 | 18 | 21 | 19 | 39 |
| 1907 | 13 | 21 | 14 | 58 | 14 | 8 | 13 | 58 |
| 1908 | 24 | 33 | 38 | 20 | 26 | 44 | 32 | 13 |
| 1909 | 26 | 2 | 31 | 2 | 30 | 59 | 33 | 20 |
| 1910 | 18 | 29 | 19 | 11 | 25 | 7 | 19 | 58 |
| 1911 | 5 | 39 | 17 | 32 | 12 | 35 | 16 | 53 |
| 1912 | 9 | 25 | 19 | 5 | 14 | 54 | 16 | 43 |
| 1913 | 2 | 41 | 8 | 35 | 4 | 24 | 5 | 34 |
| 1914 | 8 | 39 | 16 | 47 | 10 | 19 | 12 | 30 |
| 1915 | 19 | 51 | 22 | 56 | 22 | 40 | 26 | 34 |
| Means | 14 | 28 | 20 | 55 | 18 | 1 | 19 | 44 |

TABLE XXII.—*Showing Results of Dressings with Basic Slag*, 1906-15.—continued.

(*b*) TOTAL PRODUCE.

| Years. | No Manure. | | | 2cwts. Superphosphate. | | | 2cwts. Basic Slag. | | | 3cwts. Basic Slag. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | T. | C. | L. | T. | C. | L. | T. | C. | L. | T. | C. | L. |
| 1906 | 2 | 0 | 91 | 2 | 11 | 60 | 2 | 3 | 44 | 2 | 2 | 52 |
| 1907 | 0 | 18 | 17 | 0 | 19 | 13 | 0 | 17 | 106 | 0 | 17 | 82 |
| 1908 | 2 | 0 | 96 | 3 | 1 | 111 | 2 | 4 | 45 | 1 | 15 | 45 |
| 1909 | 2 | 6 | 97 | 2 | 15 | 66 | 2 | 14 | 100 | 2 | 19 | 76 |
| 1910 | 1 | 18 | 9 | 2 | 3 | 76 | 2 | 8 | 9 | 2 | 3 | 100 |
| 1911 | 0 | 13 | 20 | 1 | 13 | 12 | 1 | 5 | 42 | 1 | 15 | 71 |
| 1912 | 0 | 17 | 83 | 1 | 8 | 45 | 1 | 6 | 28 | 1 | 7 | 34 |
| 1913 | 0 | 9 | 44 | 0 | 16 | 85 | 0 | 14 | 52 | 0 | 14 | 99 |
| 1914 | 0 | 14 | 46 | 1 | 4 | 76 | 0 | 19 | 45 | 0 | 15 | 99 |
| 1915 | 1 | 16 | 30 | 2 | 2 | 12 | 1 | 19 | 19 | 2 | 5 | 63 |
| Means | 1 | 7 | 64 | 1 | 17 | 78 | 1 | 13 | 38 | 1 | 13 | 94 |

A glance at the above data will disclose the ineffectiveness for hay or grain crops of basic slag, as compared with superphosphate, even when a third cwt. of the former is set against a 2cwt. plot of the latter. The influence of the slag, however, is seen by comparing the yields with those from the unmanured plots, when differences of 3bush. 33lbs. with 2cwt., and 5bush. 16lbs. with 3cwt., will be noted in favor of the manure. When we contrast slag with superphosphate, we are at once struck with the unevenness of the results. On one occasion—1910—the 2cwt. plot of citrate soluble phosphate has given slightly better returns in hay as well as grain than the superphosphate, and the 3cwt. plot of slag exceeded the 2cwt. superphosphate on three occasions in respect of grain and four times in regard to hay.

On inspection of the rainfall tables, it will be discovered that with one exception these heavy yields have coincided with years of unusually high rainfall. Looking further into this matter, we found that if we take the mean grain yields for the three years of heaviest "useful" rain, and compare them with the corresponding returns for the three years of normal "useful" rain, the dependence of slag on rainfall in this district is clearly demonstrated. For example, in the wet years the 2cwt. plot averaged 1bush. 52lbs. and the 3cwt. plot 2bush. 14lbs. more grain per acre than the 2cwt. of superphosphate, whilst in the normal seasons the slag yielded an average of 5bush. 33lbs. from the 2cwt. and 3bush. 10lbs. from the 3cwt. dressings less than the 2cwt. superphosphate. It is in abnormally wet seasons, then, that slag shows to advantage; but it is on the mean results that we have to focus our attention, in order to gauge the value of the manure. With this end in view, we have set out in the following statement the gross and net values of the mean returns gained during the past decade.

## TABLE XXIII.—*Showing Comparative Values of Differences in Yield.*

### (*a*) GRAIN YIELDS.

INCREASE OVER OR DECREASE BELOW.

| Manure. | Mean Yields, 1906-1915. | No Manure. | | | 2cwts. Superphosphate. | | | 2cwts. Basic Slag. | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Difference per Acre. | Value at 3s. 6d. per Bush. | Net Value. | Difference per Acre. | Value at 3s. 6d. per Bush. | Net Value. | Difference per Acre. | Value at 3s. 6d. per Bush. | Net Value. |
| | Bush. lbs. | Bush. lbs. | *s. d.* | *s. d.* | Bush. lbs. | *s. d.* | *s. d.* | Bush. lbs. | *s. d.* | *s. d.* |
| No manure ................... | 14 28 | — | — | — | — | — | — | — | — | — |
| 2cwts. superphosphate ......... | 20 55 | 6 27 | 22 7 | 13 7 | — | — | — | — | — | — |
| 2cwts. basic slag .............. | 18 1 | 3 33 | 12 5 | 3 5 | -2 54 | -10 2 | -10 2 | — | — | — |
| 3cwts. basic slag .............. | 19 44 | 5 16 | 18 5 | 4 11 | -1 11 | -4 2 | -8 8 | 1 43 | 6 0 | 1 6 |

### (*b*)—HAY YIELDS.

INCREASE OVER OR DECREASE BELOW.

| Manure. | Mean Yields. | | No Manure. | | | 2cwts. Superphosphate. | | | 2cwts. Basic Slag. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total Produce. | Hay Equivalent. | Difference Hay Yield per Acre. | Value at 35s. per ton. | Net Value. | Difference Hay Yield per Acre. | Value at 35s. per ton. | Net Value. | Difference Hay Yield per Acre. | Value at 35s. per ton. | Net Value. |
| | T. C. L. | T. C. L. | T. C. L. | *s. d.* | *s. d.* | T. C. L. | *s. d.* | *s. d.* | T. C. L. | *s. d.* | *s. d.* |
| No manure ......... | 1 7 64 | 1 13 70 | — | — | — | — | — | — | — | — | — |
| 2cwts. superphosphate | 1 17 78 | 2 5 109 | 0 12 39 | 21 7 | 12 7 | — | — | — | — | — | — |
| 2cwts. basic slag ..... | 1 13 38 | 2 0 74 | 0 7 4 | 12 4 | 3 4 | -0 5 35 | -9 4 | -9 4 | — | — | — |
| 3cwts. basic slag ..... | 1 13 94 | 2 1 30 | 0 7 72 | 13 4 | -0 2 | -0 4 79 | -8 3 | -12 9 | 0 0 68 | 1 1 | -3 5 |

These figures cannot be held to favor the adoption of basic slag in this locality. The 2cwt. plot shows a net loss of 10s. 2d. per acre over that receiving 2cwt. of superphosphate, and the addition of another cwt. of slag has only resulted in reducing the deficit by 1s. 6d. per acre. In the case of hay crops, the net losses are 9s. 4d. and 12s. 9d. respectively, and hence we are bound to conclude that there is no good reason for advocating the use of basic slag as a wheat manure under Roseworthy conditions.

*(To be continued.)*

## CAPONISING.

The Poultry Expert (Mr. D. F. Laurie), in reply to a correspondent inquiring for information on the subject of caponising cockerels, said—For commercial purposes, *i.e.*, for the profitable production of table poultry for the local and for the oversea export market, it was not necessary to caponise the cockerels. In fact there was no money to be made as a result of the operation. Cockerels should be yarded separately and well fed, fattened off and sold as soon as fat, say at from 14 to 16 weeks old. To keep them longer was unprofitable, and the buyers neglect the old "staggy" specimens, and they would not suit the export trade.

Caponising should be performed on light breed cockerels at about 10 to 12 weeks old, and on heavy breeds a little later. Instruments could be purchased through a storekeeper, who would obtain them from one of the wholesale chemists. Instructions, as a rule, were on a printed slip with the outfit, and were for the particular type of instruments.

In any case it would be necessary to experiment on a dead bird. No great benefit from the operation was obtainable until the birds were 10 to 12 months old, and by that time they had cost at least 10s. each for food. To make a profit one would require from 8s. to 10s. each, and no buyers were likely to pay such prices. In older and richer countries there was but a limited market for capons.

# SEASON 1916-17.

## ESTIMATED AREA UNDER CROP.

More than ordinary interest is centred round the area sown to wheat, oats, and barley in South Australia this year (1916-17). The prevailing impression was that the area under wheat was less than that of the preceding year, and, according to the preliminary estimate prepared by the Government Statist (Mr. W. L. Johnston), that has proved to be the case. In 1915-16 3,220,645 acres were sown to wheat, and in 1916-17 3,031,889, which means a decrease of 188,756 acres—equal to 5·86 per cent. of the total. Barley is much more in evidence this year than was the case last year, the figures being—1915-16, 92,678 acres, and 1916-17, 116,391 acres; a total increase of 23,713 acres, or 25·59 per cent. The area under oats has declined to the extent of 4,985 acres, from 320,901 acres in 1915-16 to 315,916 acres in 1916-17—representing a percentage of 1·55. The total area under wheat, barley, and oats this year is 170,028 acres less than the total for last year.

Tabulated, the figures are as follows:—

*Preliminary Estimate of Area sown with Wheat, Barley, and Oats, Season 1916-17, in comparison with Season 1915-16.*

| | Wheat. | | | |
|---|---|---|---|---|
| | 1915–16. | 1916–17. | Increase or Decrease. | |
| | | | Acres. | Per cent. |
| | Acres. | Acres. | | |
| I. Central | 1,036,518 | 998,235 | — 38,283 | — 3·69 |
| II. Lower North | 960,387 | 854,854 | — 105,533 | — 10·99 |
| III. Upper North | 335,387 | 336,964 | 1,577 | ·47 |
| IV. South-Eastern | 378,472 | 362,265 | — 16,207 | — 4·28 |
| V. Western | 509,544 | 479,183 | — 30,361 | — 5·96 |
| Outside of Counties | 337 | 388 | 51 | 15·13 |
| Total State | 3,220,645 | 3,031,889 | — 188,756 | — 5·86 |

| | Barley. | | | |
|---|---|---|---|---|
| | 1915–16. | 1916–17. | Increase or Decrease. | |
| | | | Acres. | Per cent. |
| | Acres. | Acres. | | |
| I. Central | 55,006 | 65,376 | 10,370 | 18·85 |
| II. Lower North | 9,465 | 12,237 | 2,772 | 29·29 |
| III. Upper North | 700 | 762 | 62 | 8·86 |
| IV. South-Eastern | 16,803 | 27,095 | 10,292 | 61·25 |
| V. Western | 10,634 | 10,861 | 227 | 2·13 |
| Outside of Counties | 70 | 60 | — 10 | — 14·29 |
| Total State | 92,678 | 116,391 | 23,713 | 25·59 |

*Preliminary Estimate of Area sown with Wheat, Barley, and Oats, Season* 1916–17, *in comparison with Season* 1915–16—continued.

| | Oats. | | | |
|---|---|---|---|---|
| | 1915–16. | 1916–17. | Increase or Decrease. | |
| | | | Acres. | Per cent. |
| | Acres. | Acres. | | |
| I. Central | 113,609 | 104,259 | – 9,350 | – 8·23 |
| II. Lower North | 43,086 | 48,369 | 5,283 | 12·26 |
| III. Upper North | 2,449 | 3,475 | 1,026 | 41·89 |
| IV. South-Eastern | 93,158 | 99,068 | 5,910 | 6·34 |
| V. Western | 68,599 | 60,710 | – 7,889 | – 11·50 |
| Outside Counties | — | 35 | 35 | — |
| Total State | 320,901 | 315,916 | – 4,985 | – 1·55 |

The acreage sown for each of the last five seasons has been as follows :—

| | 1912–13. | 1913–14. | 1914–15. | 1915–16. | 1916–17. |
|---|---|---|---|---|---|
| | Acres. | Acres. | Acres. | Acres. | Acres, |
| Wheat | 2,579,560 | 2,699,632 | 2,842,020 | 3,220,645 | 3,031,889 |
| Barley | 94,039 | 71,869 | 73,308 | 92,678 | 116,391 |
| Oats | 316,520 | 273,718 | 267,561 | 320,901 | 315,916 |

# AGRICULTURAL EXPERIMENTS.—REPORT FOR YEAR 1915-1916.

[By W. J. Spafford, Superintendent of Experimental Work.]

## EXPERIMENTS AT HAMMOND.

(Conducted by Mr. T. Griffin.)

Since 1908 Mr. Griffin has been conducting "Dry Farming" experiments with wheat growing at his farm at Hammond, on the so-called Campbell's system of dry farming. The block of land utilised each year was divided into eight plots of five acres each, and the individual plots received different methods of soil treatment but took the same variety and same quantity of wheat and the same quantity of superphosphate per acre during each year. Under the original treatments the plots were continued for six years (1908 to 1913), when four of them were discontinued, and but a single plot put in to replace them.

The following table sets out in detail what has been the results obtained from these plots and the various methods of soil treatment followed :—

TABLE 1.—*Showing Soil Treatments and Results Obtained from Cultivation Plots at Hammond from* 1908 *to* 1913.

| Plot. | Soil Treatment. | 1908. | 1909. | 1910. | 1911. | 1912. | 1913. | Avrg. 1908-1913. |
|---|---|---|---|---|---|---|---|---|
| | | B. L. | B. L. | B. L. | B. L. | B. L. | B. L. | B. L. |
| | *Fallowed.* | | | | | | | |
| 1 | Disced ; ploughed 6in. deep ; immediately subpacked ; and thoroughly cultivated during summer. | 23 41 | 19 22 | 33 37 | 10 0 | 2 28 | Failure | 14 51 |
| 2 | Disced ; ploughed 6in. deep ; thoroughly cultivated during summer, but not subpacked. | 20 27 | 14 49 | 32 0 | 9 17 | 1 56 | do | 13 5 |
| 3 | Disced ; ploughed 6in. deep ; thoroughly cultivated during summer, and subpacked before seeding. | 20 54 | 12 22 | 31 51 | 7 43 | 2 6 | do | 12 29 |
| 4 | Disced ; ploughed 4in. deep ; immediately subpacked, and thoroughly cultivated during summer. | 17 42 | 14 15 | 32 38 | 8 25 | 2 20 | do | 12 33 |
| 5 | Disced ; ploughed 4in. deep ; thoroughly cultivated during summer, but not subpacked. | 14 21 | 8 57 | 33 0 | 8 6 | 2 35 | do | 11 10 |
| 6 | Disced ; ploughed 4in. deep ; thoroughly cultivated during summer, and subpacked before seeding. | 12 22 | 12 26 | 32 1 | 7 21 | 2 58 | do | 11 11 |
| | *Not Fallowed.* | | | | | | | |
| 7 | Ploughed 4in. deep in autumn, and subpacked. | 14 4 | 15 12 | 27 20 | 3 14 | 1 35 | do | 10 14 |
| 8 | Ploughed 4in. deep in autumn, and not subpacked. | 12 44 | 16 31 | 23 26 | 2 3 | 0 54 | do | 9 16 |
| | | in. | in. | in. | in. | in. | in. | in. |
| | Rainfall............ | 9·84 | 10·09 | 17·74 | 7·50 | 10·77 | 6·54 | 10·41 |

Plots 1, 2, 4, and 5 were continued under the same treatments until 1915, together with a plot not ploughed but only cultivated. The results for these years, 1914 and 1915, are set out below, with the averages over the whole period :—

TABLE 2.—*Showing Treatments of Plots and Results Obtained from Cultivation Plots at Hammond for the Years* 1914 *and* 1915, *with the Averages for the Period* 1908-1915.

| Plot. | Soil Treatment. | Avrg. 1908–1913. | 1914. | 1915. | Avrg. 1908–1915. |
|---|---|---|---|---|---|
| | | B. L. | B. L. | B. L. | B. L. |
| 1 | Disced; ploughed 6in. deep; immediately subpacked, and thoroughly cultivated during summer | 14 51 | Failure | 3 37 | 11 36 |
| 2 | Disced; ploughed 6in. deep; thoroughly cultivated during summer, but not subpacked | 13 5 | do. | 3 18 | 10 13 |
| 3 | Disced; ploughed 4in. deep; immediately subpacked, and thoroughly cultivated during summer | 12 33 | do. | 3 8 | 9 49 |
| 4 | Disced; ploughed 4in. deep; thoroughly cultivated during summer, but not subpacked | 11 10 | do. | 3 27 | 8 48 |
| 5 | Disced; not ploughed, but scarified 4in. at same time as other plots are ploughed | — | do. | 3 18 | — |
| | | in. | in. | in. | in. |
| | Rainfall .................................. | 10·41 | 8·57 | 8·87 | 9·99 |

Each year the above plots were dressed with 80lbs. superphosphate (36/38) to the acre.

These results show that subpacking the soil at Hammond is worth a bushel extra yield, providing that the operation is done immediately after ploughing. This is shown both with 6in. ploughing (plots 1 and 2, Table 2), and with 4in. ploughing (plots 3 and 4, Table 2).

When the subpacking is done just before seeding it gives no increase in the crop, indeed, it appears to have a slightly depressing effect, as is shown by a comparison of plots 3 and 2 of Table 1 where the plots were ploughed 6in. deep. At 4in. ploughing the yields from the plot not subpacked and the one subpacked immediately before seeding are almost identical (plots 6 and 5 of Table 1).

In any case an increase of 1bush. per acre brought about by subpacking the land immediately after ploughing is not nearly enough to encourage farmers to speculate on an implement for which there is no other work.

## VARIETY TESTS.

Besides these cultivation tests, Mr. Griffin has, since 1908, compared various varieties of wheat grown on ordinary bare fallow and dressed with

80lbs. superphosphate to the acre. The table below sets out how these varieties have behaved during the period 1908-1915 :—

TABLE 3.—*Showing Yields from Varieties of Wheats Grown at Hammond with 80lbs. Superphosphate to the Acre on Ordinary Bare Fallow.*

| Variety. | 1908. | 1909. | 1910. | 1911. | 1912. | 1913. | 1914. | 1915. |
|---|---|---|---|---|---|---|---|---|
| | B. L. | B. L. | B. L. | B. L. | B. L. | B. L. | B. L. | B. L. |
| Federation | 8 46 | 14 34 | 28 14 | 5 9 | 1 13 | Failure | Failure | 5 23 |
| Yandilla King | 7 43 | 12 41 | 22 4 | 6 9 | — | do | do | 8 25 |
| Gluyas | 7 10 | 16 41 | 24 49 | 4 20 | — | do | do | 8 40 |
| Viking | 7 58 | 16 26 | 21 37 | 8 6 | — | — | — | — |
| Cumberland | — | 15 27 | 22 21 | 5 8 | 2 45 | — | — | — |
| Pratt's Comeback | 7 59 | 14 27 | 27 17 | — | — | — | — | — |
| John Brown | 7 27 | 8 50 | 18 27 | — | — | — | — | — |
| Special Comeback | — | 17 27 | 26 55 | 5 20 | — | — | — | — |
| Bunyip | — | — | — | 5 42 | — | Failure | Failure | — |
| Turkey Red | 1 40 | — | — | — | — | — | — | — |
| Firbank | — | — | — | — | 1 42 | Failure | Failure | — |
| Thew | — | — | — | — | 1 8 | do | do | — |
| Bayah | — | — | — | — | 0 48 | do | do | — |
| LeHuguenot | — | — | — | — | 0 24 | — | — | — |
| American No. 8 | — | — | — | — | 1 8 | — | — | — |
| Red Russian | — | — | — | — | — | — | — | 9 37 |
| Golden Drop | — | — | — | — | — | — | — | 6 35 |
| Kerly's Early | — | — | — | — | — | — | — | 5 26 |
| King's Early | — | — | — | — | — | — | — | 4 27 |
| | in. | in. | in. | in. | in. | in. | in. | in. |
| Rain fall | 9·84 | 10·09 | 17·74 | 7·50 | 10·77 | 6·54 | 8·57 | 8·87 |

# ADVISORY BOARD OF AGRICULTURE.

On Wednesday, October 25th, the Board paid its annual visit to the Roseworthy Agricultural College. There were present Messrs. F. Coleman (chair), A. M. Dawkins, C. J. Tuckwell, W. J. Colebatch, Professor Perkins, and H. J. Finnis (Acting Secretary). The greater part of the day was devoted to the inspection of the crops, stock, and appointments generally.

Business dealt with included a notification from the Minister of Agriculture to the effect that he had reappointed to a seat on the Board for a period of two years Messrs. J. Miller, C. J. Tuckwell, F. Coleman, and G. R. Laffer, M.P. The Board was also notified that Mr. C. E. Birks had resigned from the Board.

The name of Mr. W. Gum, of Amyton, was added to the list of life members, and approval was given to the addition of 111 names to the rolls of existing Branches.

New Branches were approved as follows:—Blackheath, Edillilie, Eurelia, and Minnipa.

# THE AGRICULTURAL BUREAU.

## THE TWENTY-SEVENTH ANNUAL CONGRESS.

*(Continued from page 212.)*

### Second Day—Tuesday, September 5th.

### ESSENTIALS IN THE SUCCESSFUL OCCUPATION OF A SCRUB BLOCK.

A paper entitled "Essentials in the Successful Occupation of a Scrub Block," by Messrs. F. Tregenza and G. H. Wall, Coonalpyn, was read by the former, as follows:—

One must be careful in treating a subject of this title because by "essentials" one means those things which are indispensable to success. It might be easier to tabulate those things which are not important in the highest degree in the matter of making a success of a scrub block

The type of man who will succeed is the man who possesses above all else great staying power. He needs a strong heart even more than strong muscles, because the initial work is not as laborious as it is slow and tedious. He needs abundant patience and a willingness to put in long hours when necessary. He should be of a practical type, and possess, if possible, some experience of the work to which he is going. Some have affirmed that practical experience is more to the man starting than a solid bank balance. This may be, but a man of average intelligence with £500 or less has as good a chance, if he uses his judgment and follows the best advice. In the selection of a block he must first consider the means of transporting his produce to market. However good an outback block may be, he should keep within reasonable distance of rail or river. When we consider the vast areas of good country adjacent to our railways held, but unoccupied, and think of the difficulty the would-be settler has to secure a block, and the distance from the metropolis he has to go for it, we are compelled to the conclusion "there is something wrong somewhere."

It is essential to success that a good water supply be assured. If it is not there naturally it should be the first duty of the settler to provide it by catchment. There is so much good wheat-growing mallee country well watered that one wonders sometimes why men choose a locality where there is no prospect of underground supplies. There is nothing more unprofitable than water-carting. It is doing something for nothing, and is a direct loss to the occupier and to this country.

With regard to the plant for a scrub block, everything which is not strictly necessary is a waste. The settler should have few implements, but good, and of the types which so far have proved best suited to his district. Discarded ploughs and cultivators lying about the place generally indicate money unwisely spent. The main consideration in purchasing equipment—horses or implements—should be, is it the best I can get, within my means, to promote the productiveness of the block?

In considering the methods of working a scrub block it is well to start with a plan, and, to save after regrets, place the homestead in the most convenient working position. One must not be too dogmatic in saying how a block should be worked, because one financially handicapped cannot always do what he likes or what he knows would be the best. He can then only do all he can as well as he can. On the other hand, one may be financially strong, but lack common sense and wise management, and fail.

In the first few years of occupation of our second class mallee land only a small margin of profit should be expected; hence the need for economy in working. The cheapest methods of preparing the ground should be adopted, so long as they are thorough, and an implement to get quickly over the fallow should be used at seeding time. Many blocks are partly spoilt when firing the first rolling. There is no excuse, ordinarily, for letting a fire get out of bounds. No more scrub should be rolled than can be properly kept under. Cutting two or three year old bushes does not pay, and land which through lack of time or want of rain has to be let go becomes worse than virgin scrub to deal with. There must be constant warfare on the shoots. Dead roots do comparatively little harm in the ground. On land where the mallee is exceptionally dense one should sow as a first crop oats or a flaggy wheat of brittle straw for firing. It pays to put a man on with the fire rake, to catch the hottest of the weather, as early as possible. There is no implement more essential on a new mallee block than the fire rake. Every possible chance to scorch shoots should be taken. We hope in the near future to have a scorcher (within the reach of the beginner) for killing the shoots on other than stubble land.

To be successful one must fallow, not simply for reason of moisture conservation or, what is still more important, the sweetening of the soil, but because it is the only way the average settler can get his seed bed ready in time, there being on new land so much labor in getting the land clear of stumps, stones, and rubbish.

The wise management of a scrub block will include economy in feeding stock; looking ahead and growing small paddocks of stuff to save other feed and keep up condition. It will mean the prevention of waste and leakages in the field, in the stable, and in the house, and that attention to little things which is so essential.

In order to succeed the settler will find it essential to spend money and to employ extra help at times for the first few years to get his block in order. He should not be in too much hurry to go in for side lines, his whole energy and attention for the first two years, at any rate, should be devoted to his land, and just what buildings and fencing is necessary. As soon as the way is clear he should have sheep, erring rather on the side of having too few than too many. While, of course, sheep need considerable attention, it is beyond question that they aid materially in the extermination of the mallee, and as fallow cleaners are almost essential.

There are a multitude of things which are quite optional, but to the settler who recognises that there are essentials and applies himself diligently to them there is every prospect of success.

## CAN MALLEE LAND OF A POOR, LIGHT, SANDY NATURE BE PROFITABLY OCCUPIED?

Mr. J. Gray, of Claypan Bore, read a paper entitled "Can Mallee Land of a Poor, Light, Sandy Nature be Profitably Occupied?" as follows:—

I approach this question with some amount of diffidence. I have had some experience with the cultivation of sandy soil, but not just of the class that the title of this paper indicates. Consequently I cannot speak with authority. I am approaching it with an open mind. It is really a matter of £. s. d. whether this class of land can be made sufficiently productive to repay, with a fair margin of profit, the money and labor put into it. I am hoping that in this Congress there may be "pathfinders," who out of their experience can throw more light on this subject than I can, and thus by comparing notes we may arrive at some conclusion regarding it.

### THE PROBLEM.

The class of land indicated by the heading of this paper is not the class that usually gives fair returns when properly treated, viz., fairly large hills of white sand, intersected by flats of varying width, of dark or red loamy sandy soil, all covered in its natural state with a good growth, mallee, broom, pine, and other bushes, which, when rolled down and burnt off, usually makes a good blaze, that conduces to the sweetening and general improvement of the soil. The land I have in view is that not only the higher portions of which consist of white sand, but also the intervening flats are of the same formation, where white sand predominates on the flats as well as on the hills, and where the natural vegetation is generally stunted and scanty, giving the country an uninviting, desert appearance. This class of country is usually valued by the Crown Lands Department at from 2s. 6d. to 5s. per acre. The 5s. selection generally includes some land of a better quality. South Australia has an immense area of mallee land, but, unfortunately, a great deal of it consists of this poorer class of country. A considerable area of this sort of country has already been selected, and a great deal more is being got ready for selection. Not only has the State built railways to accommodate present and prospective settlers on such country, but it has also lent goodly sums of hard cash to assist these settlers to develop their holdings. Hence the importance of the question of the successful occupation of this class of country.

### THE RAINFALL.

Regarding the rainfall, I need only say that the class of country under review does not require a heavy average one; 10in. to 12in., if it falls at the right season of the year, will give better results than 15in. to 18in. Heat from fire and sun seems more beneficial to this class of soil than cold, wet chilly conditions arising from an excess of moisture.

### DISTANCE FROM MARKET.

In country where sand predominates the roads are usually heavy, and it cannot be profitably occupied at a long distance from a railway or sea port. Five miles is quite far enough. Otherwise much valuable time will be lost in carting supplies and produce. The social life, too, on the farm will be at a discount.

### PERMANENT WATER.

Permanent water must also be obtainable in quality and quantity suitable for stock. If it can be used for irrigation, so much the better, for a kitchen garden will be a great factor in supplying the family needs.

### METHOD OF OPERATION.

It is coming to be generally recognised that wheat cannot be successfully grown continuously on white sandy soil. I know of many share farmers who are only cultivating the flats and the slopes of the sandy rises, the tops being left severely alone. If in its natural state there is a good growth of mallee and broom, so that a good burn off can be secured, these light rises under favorable conditions may give a return of about 8bush. per acre. An 8bush. crop on sand does not leave sufficient stubble to give a good fire amongst the green shoots, even with the aid of a fire rake. Consequently the subsequent crop will probably be poor, working out at about 3bush. per acre. If the cultivation is continued in the hope that ultimately, with liberal dressings of super. and good cultivation with the plough to eradicate the roots, the farmer will probably be rewarded, especially if the land has been fallowed, with a fine promise in early winter and spring that will end in takeall and disappointment at harvest time. Experience shows that where wheat fails on this light soil oats will thrive and give good returns either as hay or grain. Barley and rye will also do well on this class of soil. Most mallee farmers in the past have been reluctant to grow this class of cereals on account of the difficulty of finding a ready market for them. I am convinced, however, that if more attention had been paid to their culture before the 1914 drought there would have been large supplies of hay and other fodder on hand, the value of which at such a time would have been incalculable. This fodder could have been grown in many cases where wheat was a partial, if not a total failure. While speaking of the drought, another factor comes to mind. All meat food for human consumption has more than doubled in value, and although it is not likely to maintain its present high figure it will command a good price for many years. It becomes therefore a question whether it will not be better on the light sandy soils to go more largely for growing the class of cereals indicated, and market them principally as beef, mutton, wool and dairy produce. I know I am advocating an innovation. The usual practice is to grow wheat and wheat only in the early stage of mallee settlement, and work into what is known as by-products later on as opportunity offers. This, of course, is quite proper so far as the better class land is concerned. But I am convinced that attempting to grow wheat only on poor light sandy soil is an unprofitable business. My own experience goes to show that by taking three crops of oats in succession off this kind of land the field may then be sown with wheat with good results. Thus past experience seems to indicate rotation of crops and mixed farming for this class of soil from the start. Here, however, at present, we are up against a difficulty. Where stock are kept the land must be fenced. Fencing material has assumed war prices to such an extent that its use is almost out of the question. Let us hope, however, that we are nearing the end of this dreadful state of affairs. The war, with all its dark associations, will pass into history. But drought conditions will be our experience from time to time in the future as in the past. Thus fencing material will become cheaper, while to a large extent beef and mutton will continue to realise good prices. At any rate, we may assume that by the time the discussion arising out of this paper becomes digested and gets into the blood of action these things in regard to prices will have become more normal.

Let us now see how the selector is to go about this business of making a success of farming this poor sandy soil. May I lay emphasis on the fact that this land has to be reclaimed and, to a large extent, made. Therefore the settler cannot afford, however much capital he may have, to buy a holding from a land jobber. It must be selected from the Government. Then it will have the advantage of being rent free for several years. The natural vegetation on this soil is usually light. By using a ribbed roller a lot of labor will be saved in cutting springbacks. It will not be a great effort to roll and burn off 400 acres in the proper time. In this area there are likely to be some better portions, such as loamy flats between the rises, say 100 acres in all. This can be sown with wheat. If twice this area of better class land can be obtained so much the better. The next best land should be sown with barley, and the balance with oats. Thus there will be approximately 100 acres under wheat, 150 acres with barley, and 150 to oats. I propose to set aside 50 acres of barley and 25 acres of oats for grazing. This should carry say five cows, a bull, and six or seven horses during the winter months and until the stubbles are ready for them. This portion of the field, of course, will have to be fenced off. Twenty-five acres of oats will probably be available to be cut for hay, and the balance of the field can be stripped for grain. There is one difficulty that must be considered in connection with growing oats and barley. Under normal conditions wheat will remain on the straw in a ripe condition for weeks without much loss. Consequently, on many farms in the mallee, where large areas are under crop, and the means of the settler are limited, the risk is accepted, and the stripping prolonged for six, and sometimes even eight, weeks. But with oats and barley, if they remain a week after they have ripened it is often found to be too long, and a considerable quantity of the grain is wasted. Where mallee land has been tilled several times this difficulty may be overcome by binding the crop in the green stage. In the case of a first crop, however, there is the problem of clearing the land of roots and sticks so that the binder may be put over the land. Then a stubble burn is a great factor in clearing the land and fertilising it for the next crop. So the method of harvesting the oats and barley is a matter of choice between saving all the crop on the one hand and the opportunity to do a little towards preparing the land for the next crop.

Let us now look at the financial aspect of the venture we have in mind:—

*Estimated Cost of Tilling* 400 *acres of Light Mallee Soil.*

| | £ | s. | d. |
|---|---|---|---|
| 100bush. seed wheat at 3s. 6d. per bushel | 17 | 10 | 0 |
| 150bush. seed barley at 3s. per bushel | 22 | 10 | 0 |
| 150bush. seed oats at 2s. per bushel | 15 | 0 | 0 |
| 10 tons super. at £5 per ton | 50 | 0 | 0 |
| Cultivating and drilling at 4s. per acre | 80 | 0 | 0 |
| Harvesting 325 acres at 5s. per acre | 81 | 5 | 0 |
| 1,130 cornsacks | 38 | 0 | 0 |
| Interest on, say, £400 capital other than that employed in working stock, and implements, at 10 per cent. | 40 | 0 | 0 |
| | £344 | 5 | 0 |

| | £ | s. | d. |
|---|---|---|---|
| 100 acres wheat at 10bush. per acre at 3s. | 150 | 0 | 0 |
| 15 tons hay from 25 acres at £2 per ton | 30 | 0 | 0 |
| 100 acres barley at 12bush. per acre at 2s. per bushel | 120 | 0 | 0 |
| 100 acres oats at 12bush. per acre at 1s. 6d. per bushel | 90 | 0 | 0 |
| Returns from 5 cows, including calves reared | 50 | 0 | 0 |
| | £440 | 0 | 0 |

I have not included the cost of clearing the land, which would be about 4s. 6d. per acre, as that remains an asset on the holding, and should not be debited against the first crop. The balance to the credit of the venture of about £95 15s. is very little, but there would be a fair margin of profit on the work done on the holding at the figures allowed. Nothing has been allowed for the labor incurred in getting the return from the cows. But the skim milk not required for rearing the calves can be fed to pigs, and in a measure compensate for the work involved.

If the settler's capital is limited he will be wise to confine his operations for the second year to the field already cleared. The portion under wheat will probably stand another crop. Some of the parts that carried barley may be put to oats, and vice versa, and his mixed farming branches enlarged, converting as much as possible of his previous year's crop into dairy produce. If, however, the necessary capital is available another field may be cleared and treated in the same way as the previous one, whilst that one may be drilled with 1bush. oats and 40lbs. of super. per acre at a cost of about 7s. 6d., including 1s. per acre for rent. This may be kept entirely for a grazing paddock. If it is stocked with sheep it will probably produce 10s. worth of mutton and wool per acre. Not much of a margin, it is true; but then it must be remembered that the land by this treatment is being reclaimed and improved very materially, because after another crop of oats has been taken it will most likely give a good return when sown with wheat. The general experience is that sheep thrive remarkably well on this class of country. Various kinds of bush that sheep eat grow on light soils, and these make a good variety of feed in conjunction with the oats that are sown for them or when they are on the stubbles. They also pick up a great deal of the grain that is lost in harvesting.

### CONCLUSION.

We can estimate fairly accurately the probable cost of such a venture, but the difficulty is to get an accurate idea of the income. This we can only get by experience. If my estimate of probable income is near the mark, then there is a chance of this class of country being successfully occupied. But if it is too high, then the selector will be well advised not to venture. Experience indicates that poor, light sandy soil improves in producing quality when treated as I have suggested. I am convinced that the only way this class of country can be successfully occupied is by a judicious rotation of crops that will improve the land from the start.

### DISCUSSION.

Mr. F. C. Fleet (Salisbury Branch) said he had 20 years' experience of mallee farming in Victoria, and the light, sandy soil mentioned in the papers was generally left alone, unless it could be cleared sufficiently to get rid of vermin. The first thing that should be seen to in the occupation of that land was water, and he believed the Government should take steps in that direction. His experience was that the light, sandy soil was best left alone, because the heavy cost of working made it unremunerative.

Mr. A. V. Nairn (Mallala) considered that a man who went into the back country under present conditions was a bit lacking in intelligence. He knew of men who had had to subsist on water containing an ounce of salt to the gallon, because their stock was too poor to cart good water. They had been promised a water supply, pumped back from the Murray, for the last four years, but so far nothing had been done. He was not blaming one Government any more than another. They were all to blame, and not enough pressure was brought to bear on them. They all seemed to regard the "cocky" as a man used to hardships, who could put up with anything. Unless the Government put in hand a consistent policy of assistance for settlers in the back country, it was no use asking men to go on to it.

Mr. J. Sabey (Cummins) said that one big factor in the settlement of land in the Eyre's Peninsula mallee would be the establishment of a through rate of freight for imports and exports to and from Port Adelaide.

Mr. A. Jamieson (Yongala Vale) contended that any land that required railways every five miles to make it payable was not worth while bothering about.

Mr. R. F. Mayfield (Bookpurnong East) said that if a block was worth having, it was worth fencing. He referred to the importance of fallowing and the keeping of sheep. He said that continual wheatgrowing would not pay in light soil.

Mr. O. P. L. Payne (Mindarie) touched on the subject of the rolling of green scrub, which, he said, should not be done too early. Too heavy an implement was not wanted in light sandy soil. A cultivator, which would stir the soil well, would be better. He advocated fallowing every third year, and said it was unwise to clear too much land at a time.

Mr. A. B. Ferguson (Moonta) said that by cutting scrub towards the end of September one got it just when the sap had risen, and the further growth of young shoots was prevented.. For the first few years he would have no sheep on scrub farms at all, because the growth of grass between the scrub was of great use in burning it off. It was his experience that sandy soil would do well with crops grown in rotation, and he advocated the sowing of oats drilled into the fallow.

Mr. John Welch (Arthurton) suggested that the growing of peas on light soil in the first place led to the growth of good wheat crops later on. Wheat land required plenty of nitrogen, and peas were very rich in that. The experiment had been tried in his district of putting sheep into the peas, and it had proved successful, for the sheep got all the good there was to be got in the pea crop, and their constant moving over the ground was not only nearly as good as fallow, but also stopped the drift. It was no use expecting a crop of wheat after barley. If they were going in for rotation of crops they would have to keep more sheep in order to pay the bill.

Mr. L. E. Cowley (Roberts and Verran) said his branch had experimented with plots and found that the most payable quantities in sowing were 45lbs. of seed and 1cwt. of super.

Mr. E. Correll (Minlaton) thought it a bad policy to cultivate light sandy rises too much. The straw should be allowed to rot into the soil. In time it would become humus, and reinforce the soil.

Professor Perkins (Director of Agriculture) said the troubles of light sandy land had affected people all the world over. When he was a much younger man he tackled a sandhill, and after struggling with it for two or three years, made a mental reservation that he would never do so again. He had often thought that, instead of trying to put such land under cultivation, it would be much better to treat it as forest land. His experience was that sand always drifted, if given the slightest chance. There were, however, instances of successful occupation of sandy land in other countries. In Silesia, for example, there were vast tracts of white sand. In the south-east of South Australia there were similar tracts, and he had hopes of it, because of the good rainfall. The principle adopted in Silesia in the working of that land was to sow green crops and then to plough them in. That put a large amount of organic matter into the soil, and proper working up made it fertile. That might only be possible where a greater degree of closer settlement was possible. There was no doubt that a great deal of land which was of no use to them to-day could be made of use when population increased. After all, were they wise to take up sandy land when they had large areas of a different character available for wheatgrowing? Personally he did not think so, although he admired the pluck of the man who did. On farms where there was a fair amount of sand he would avoid breaking up that portion of it which was inclined to drift. In regard to the rotation of crops, he advised the growing of peas rather than barley, if later they were fed off. Sandy soil should be touched as little as possible. Overworking it did more harm than good. Summing up, he would say, don't put the land under crop too often. Too frequent working made it drift, and good results would not be obtained.

Mr. Colebatch (Director of Roseworthy Agricultural College) said that in many instances the trouble with sandy soil in South Australia arose out of the fact that the land was not properly looked after. He had seen a lot of fallow in light land carrying more crop than land that was under crop. What was likely to do good in light land, particularly in mallee land, was some successful form of machine which would burn off the shoots. He did not think it was too much to hope that, in a country like South Australia, which had originated such a machine as the stripper, to get someone to come out with some such machine.

Messrs. Tregenza and Gray briefly replied.

## THE SHORTAGE OF AGRICULTURAL LABOR.

Mr. O. J. Murphy (Penong Branch) read a paper entitled "The Shortage of Agricultural Labor," as follows:—

One of the direct results of the war is the shortage of agricultural labor, a fact which may well give the farmer reason to rejoice. Hundreds of men engaged in the peaceful pursuit of agriculture two years ago have gone forth to defend their country. No patriotic farmer can regret the departure from Australia of men whose work on the farm has fitted them well, both physically and morally, to become soldiers.

But it is still the duty of the farmer, who must stay at home, to produce all the wealth he can, for by so doing he will do a share towards the maintenance of our soldiers in the field of battle. The agricultural community is called upon to provide recruits, and at the same time to maintain, and, if possible, increase production. The problem confronts a great many farmers. On the Far West Coast an exodus of farm laborers was a natural consequence of the poor seasons 1913 and 1914, and the numbers have been still further reduced since the outbreak of war. Enlistment has been especially brisk since the beginning of the present year, with the result that some districts are practically drained of farm laborers. In the hundred of Cohen, one of the best wheat-producing hundreds on the Far West Coast, there are but three or four agricultural employees. Five or six times these numbers could find employment in the hundred during the coming harvest, and there is reason to believe that other hundreds on the West Coast are similarly situated. The area under crop at present is equal to, if not greater, than the area under crop last year. Farmers placed as great an area as possible under crop without the foreknowledge of how they would manage the harvest operations should the season be a favorable one. As it is, the season promises to be one of the best on record, and farmers are already on the lookout for any available sources of labor.

Co-operation among the farmers themselves has been suggested, and tried to a small extent: but it is obvious that even if co-operation were extensively practised the problem of the shortage of labor would be only partially solved. A and B may help one another with advantage during the hay-making and wheat-cleaning periods, but where large areas are under crop A cannot afford to leave his matured crop and spend a week reaping on B's property. Nevertheless, the probability is that co-operation among farmers will be the main solution of the problem during the coming harvest.

The fact is recognised that the shortage of labor is a direct result of the present war, and farmers will make the best of existing conditions. But it may be well to consider further this subject forced upon our notice at the present time. The long distance of some of the newly-opened areas of the State from the capital and the absence of means for rapid transit have proved an effective barrier against obtaining good agricultural laborers. Farmers in the outlying districts have to be content with the poorer class of men, who possibly have not been able to obtain employment in the more settled areas. This difficulty, so far as the West Coast is concerned, is bound to be mitigated as the outlying districts are brought into closer communication with the settled areas by means of the extension of railways. It is also certain that a better class of farm laborer would be attracted to the newly-settled areas if better accommodation were provided for them. Too often the quarters of the farm hand are nothing more than a hovel. Men who have not the capital to buy improved farms must look to the newly-opened-up areas for a block of land, and often for experience. The provision of better accommodation on the average farm would certainly attract more such men. It is idle to expect a man to live in a bag hut and to perform his work satisfactorily—work that is often very strenuous.

But perhaps the best solution of the difficulty of the shortage of labor would lie in encouraging the public school boy to take a greater interest in the principal industry of the State. In the experience of the writer the average school boy in the city knows little or nothing of agricultural pursuits, nor is he encouraged to learn much about them. Would not the State be benefited if more boys were to become farmers and fewer office boys and clerks? The city-bred boy, as well as the country lad, should be encouraged to follow agricultural pursuits. Undoubtedly hundreds of boys leaving school could find employment on the farm, and farmers would be only too pleased to train such boys, knowing that in them they would find a more reliable and permanent employee than in the casual laborer.

It is to be hoped that the present problem of the shortage of agricultural labor will induce those in authority to provide means for encouraging greater numbers of our boys to become agriculturists.

## WHEAT-GROWING ON SALINE GROUND.

A paper entitled "Wheat-Growing on Saline Ground" was read by Mr. W. H. Richards (North Booborowie) as follows:—

This paper is confined to the two principal forms of saline ground found in the Booborowie district. The average annual rainfall of Booborowie is 16½in. The chief features of the climate are wet winters, with good growing conditions in the spring, and long, dry, and very hot summers. Summer conditions usually prevail for about five months in the year. Saline conditions are to be found in various places; they are noticeable in the shape of salt patches on the tops and sides of the small hills of the undulating country of the district, and are also to be found at the foot of practically all of our hills, where the drainage from the hill soaks into the flat ground beneath. We also have them in a swampy flat which runs right through the district.

In practically all cases saline conditions are the result of water penetrating to a considerable depth and dissolving the injurious salts which are in the earth, and as the water is drawn off by evaporation the salt is deposited on the surface of the soil in quantities sufficient to destroy plant life. That evaporation is one of the chief causes of saline conditions is clearly shown by the fact that whilst it is usually found on heavy clay soils, there is never a tendency to it in the light sandy soil, which in its natural state holds moisture almost as well as fallow land on the heavier soils.

It is likely that some salt patches may be the result of one very wet period, and that the concentration of salts is not now going on. This is the case where salt patches are conspicuous on new ground, and speedily disappear on being cultivated. The salt patches on the perfectly drained, rising ground, are probably an exception to this rule. The hills referred to are of a soft slate rock, set almost on edge, with seams of a very retentive clay, and covered with a few inches of fine-grained clay soil, and in their natural state had tussocks of black grass growing on them. In this case it seems probable that the saline matter is contained in layers of rock at no great depth beneath the surface, and is drawn up by the power of the sun. On many of these salt patches the soil and soft rock are being fretted away by the action of the salts, which is evidence that the origin of the saline matter is in the rocks which are on the surface. Here the affected land is covered with a thin layer of powdered soil and rock. If this is scraped away in midsummer, when the unaffected land is parched, it will be found that the patch is damp. This is caused by the salts absorbing moisture from the air, and how great must be the proportion of salts in the soil to gather and hold moisture in spite of the fierce heat. The salt patches at the foot of the hills are more easily explained. They have in the past absorbed great quantities of water that drained on to them from the hills above, which evaporated, leaving on the surface the salts which had previously been distributed through the earth. In connection with this, it is interesting to notice that where there is a small gutter in the vicinity there is not the least sign of a salt patch, which shows plainly the value of an efficient system of drainage in cases of this kind.

In both of these cases it will be found that the affected land does not absorb the moisture to anything like the same extent as the land which surrounds it. It will remain hard and firm even though the adjoining land is soaked to its full capacity. This is caused by a hard and apparently waterproof crust which is invariably found on these places, usually on the surface; occasionally a few inches below it. Its presence might be explained by the action of chemicals on the soil, but it is probably caused by the entire absence of humus which has allowed the soil to run together into this exceedingly hard crust. In preparing this land for wheat it will be well to remember that the wheat plant is one of the most sensitive of cereals. It will germinate well in a very little wholesome soil, but it is necessary that it should have enough soil to germinate in.

As the salts have collected in the surface soil a deep ploughing will turn them down, and will at the same time bring soil to the surface that is comparatively free from injurious salts, and if evaporation is consistently prevented by keeping about 6in. of loose soil on the surface by cultivation, or by shielding the surface from the sun with a growing crop, the salts are not likely to rise again; but will gradually be distributed through the depths of the earth, where they will be harmless to growing crops.

Deep ploughing is also necessary in order to break the hard crust and let the water into the ground. This operation is likely to bring clay to the surface; but the depth is essential to success, and the clay is easily covered with soil by the use of a grader, in fact, if the patches are small, the ordinary methods of cultivation will soon drag sufficient soil across them to support a crop. A great improvement can be made, however, by the addition of organic matter, such as stable manure, which is excellent, or if not obtainable in sufficient quantities, cocky chaff or straw is almost equally as good. If this is done, and reasonable care taken to prevent the connection between the sun and the saline matter being re-established, permanent success is assured, and the salt patches will be seen no more. The case of swampy flat is the subject of considerable local discussion. The general opinion is that if it is effectually reclaimed it will prove to be very productive, and as it covers an area of 15 miles long by about one mile wide, it is a matter of great importance. The flat occupies a strip of country between two ranges of high hills, each a little more than a mile distant. The permanent springs are about 5ft. below the surface, but when fed by the heavy winter rains they rise until there are several inches of water all over the flat. With the end of winter the water gradually goes down, leaving behind many small lakes which, after standing a while, become salt; the water is drawn off by the sun and the salts remain in the soil. All of the affected land grows a thick mass of salt land barley grass; it germinates after the early winter rains, or after exceptionally heavy autumn rains, and when the water subsides it comes quickly to maturity, and by the time the water rises again is little more than a rotting mass. It is noticeable that although the hard crust can be found in salt patches close to the flooded land, it is not to be found actually in the flat, where the decaying grass forms an abundant supply of humus.

Before any method of cultivation can be successful in cases of this kind, the water, together with the injurious salts, must be removed by drainage. Open drains are recommended, as they are quickly and cheaply constructed by means of a plough and scoop. The levels of the ground should be taken, and the drains laid out in a system that will keep the water moving. If the drains are large enough and properly constructed, it will be found that the winter rains, which formerly were the cause of the trouble, will gradually wash the salt out of the land and into the drains. However, the land should be cultivated and treated as saline. It should be fallowed early in the season to a depth of at least 6in., and in order to allow the soil which otherwise is sour, to aerate, it should be allowed to remain in a rough state as long as winter conditions prevent the danger of evaporation. It should then be broken down, and should be kept cultivated through the summer to a depth of 4in. to prevent evaporation.

The ground should be carefully graded to prevent surplus water being held in hollows instead of going into the drains. Seeding operations should be the same as on other land, and having produced a crop, the straw should not be removed during the summer months, as it protects the soil from the fierce heat. With careful and systematic attention there is no doubt that wheat can be grown, even on land badly affeced with salts, with a remarkable degree of success.

### DISCUSSION.

Mr. H. Waters (Renmark) said the experience of fruitgrowers was that the deeper they cultivated the less evaporation would go on, and by reducing evaporation they would reduce the amount of salt rising to the surface.

Mr. A. G. Collis (Mypolonga) said there was much difference of opinion on the swamp blocks with reference to shallow or deep ploughing. Personally, he considered deep ploughing in the swamp country was not wise.

Mr. A. A. Jefferies (Mount Bryan) said for land such as had been referred to by Mr. Richards the cultivation of various fodder grasses was better than wheatgrowing.

The Director of Agriculture said, in dealing with that class of land, they should, instead of a cultivator, use a multi-furrow plough to turn up the ground, in order that there might be sweet soil on the surface and salt below. An early cereal could be sown, such as barley, which grew quickly and ripened before the salt could be brought back to the surface.

(*To be continued.*)

# THE AGRICULTURAL OUTLOOK.

## REPORT FOR MONTH OF OCTOBER.

The following reports on the general agricultural condition and outlook of the areas represented by the Government Experimental farms mentioned below have been prepared by the respective managers:—

*Eyre's Peninsula.*—The weather has been comparatively cool, several sharp morning dews were noticed. Light rains fell, scattered over the opening fortnight, and a good, steady rain was received on 22nd and 23rd inst.; 182 points of rain were registered for the month, as against 41 points for October, 1915. Strong winds at the latter end of the month laid down rank patches of the crops. Crops are filling their ears splendidly. Haycutting in the district is completed, only a small area being converted into hay this season. Natural feed is in abundance, and stock are in first class condition.

*Kybybolite.*—Weather conditions have been entirely satisfactory to farmers; 217 points of rain fell, and this was so distributed as to give a fairly even amount of rain and sunshine for each week of the month. Temperatures have been generally mild, but one sharp frost was experienced. A gale of wind on the night of the 22nd caused some damage to very forward crops. Crops almost invariably look well, and are just coming out in ear. Takeall is noticeable, but is not showing extensively. Summer crops are getting a good start; the germination of kale promises good results with that valuable crop. Natural feed is now at its best; it is running up to the flowering stage, and shows a length of from 9in. to a foot. It is said to be many years since feed has been as plentiful as at present. Stock—Horses and cattle are looking very well; sheep on natural pastures do not compare with those feeding on cultivated fodders as well—the former do not pass a certain standard of improvement whatever the food conditions. The difference is even more marked in the growth of the lambs. Shearing operations are well advanced, and a good clip is being obtained. Miscellaneous—The rains have extended the average fallowing season, and the ploughs have been kept going; the ground will become too hard to continue, however, after the first dry weather.

*Turretfield.*—The weather during the month has been very changeable, varying from mild temperatures to cold and boisterous conditions. Three heavy frosts were recorded, and the rainfall totalled 193 points, of which 1in. was registered on the 22nd. Winds of hurricane force were experienced at times. All crops are now fairly advanced and looking well. The oat and barley crops promise heavy returns. The frosts did no damage to the cereal crops, but some vineyards suffered considerably. Potatoes, too, were affected. In one instance, of three varieties planted at the same time under the same conditions and growing side by side, one (Carmen) was cut badly, but the other two (Up-to-date and Pinkeye) were not at all affected. Natural feed has gone to seed, but there is a plentiful supply, and it seems to be of high nutritive quality. Horses and cattle are thriving well on it, and the practice of turning the stock into the paddocks instead of feeding them in the stable is at present generally adopted in this district. All stock are wonderfully fit and in excellent condition. Miscellaneous—Preparations for haymaking are in full swing, and operations will probably be started at the beginning of November.

*Veitch.*—Weather conditions have been very mild this month; hardly any warm weather has been experienced. Rain for the month, 164 points; average for Veitch, 66 points. Have had a few frosts, which appear to have done a little damage to crops in different parts of the district. Crops are all heading well, and look promising. Natural Feed—Good, but is now turning color. Stock all in marketable condition. Haymaking operations have started on many farms.

# RAINFALL TABLE.

The following figures, from data supplied by the Commonwealth Meteorological Department, show the rainfall for the month of and to the end of October, 1916, also the average precipitation to the end of October, and the average annual rainfall.

| Station. | For Oct., 1916. | To end Oct., 1916. | Av'ge. to end Oct. | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| **FAR NORTH AND UPPER NORTH.** | | | | |
| Oodnadatta | 2·03 | 7·89 | 3·94 | 4·76 |
| Tarcoola | 2·40 | 5·65 | 6·48 | 7·58 |
| Hergott | 2·24 | 5·32 | 4·97 | 6·04 |
| Farina | 1·62 | 6·31 | 5·62 | 6·70 |
| Leigh's Creek | 1·50 | 6·00 | 7·32 | 8·66 |
| Beltana | 1·17 | 7·05 | 7·77 | 9·22 |
| Blinman | 1·53 | 10·17 | 11·16 | 12·83 |
| Hookina | 1·71 | 16·23 | — | — |
| Hawker | 2·00 | 16·58 | 10·57 | 12·22 |
| Wilson | 2·68 | 16·55 | 10·34 | 11·78 |
| Gordon | 1·81 | 12·49 | 8·97 | 10·26 |
| Quorn | 3·11 | 17·62 | 12·30 | 13·78 |
| Port Augusta | 1·27 | 9·40 | 8·26 | 9·46 |
| Port Augusta W. | 1·29 | 9·49 | 8·24 | 9·36 |
| Bruce | 1·82 | 10·76 | 8·85 | 10·01 |
| Hammond | 1·37 | 10·64 | 10·02 | 11·46 |
| Wilmington | 3·05 | 19·57 | 16·38 | 18·26 |
| Willowie | 1·36 | 12·67 | 10·58 | 11·90 |
| Melrose | 3·92 | 27·50 | 20·90 | 23·04 |
| Booleroo Centre | 2·39 | 16·31 | 14·01 | 15·83 |
| Port Germein | 1·48 | 8·28 | 11·28 | 12·84 |
| Wirrabara | 2·40 | 24·29 | 17·01 | 18·91 |
| Appila | 1·99 | 14·94 | 13·21 | 15·08 |
| Cradock | 1·30 | 9·54 | 9·62 | 10·86 |
| Carrieton | 1·28 | 13·41 | 10·61 | 12·22 |
| Johnburg | 0·96 | 10·00 | 8·77 | 10·21 |
| Eurelia | 1·60 | 13·66 | 11·56 | 13·24 |
| Orroroo | 1·48 | 13·78 | 11·78 | 13·42 |
| Black Rock | 1·14 | 12·88 | 10·59 | 12·25 |
| Petersburg | 1·98 | 13·81 | 11·31 | 13·07 |
| Yongala | 1·99 | 16·49 | 12·09 | 13·94 |
| **NORTH-EAST** | | | | |
| Ucolta | 1·90 | 12·19 | — | — |
| Nackara | 0·92 | 9·97 | — | — |
| Yunta | 0·30 | 7·46 | 6·94 | 8·22 |
| Waukaringa | 0·64 | 8·62 | 6·74 | 7·94 |
| Mannahill | 0·27 | 7·45 | 7·05 | 8·46 |
| Cockburn | 0·97 | 9·10 | 6·74 | 7·97 |
| Broken Hill, NSW | 1·26 | 9·09 | 8·24 | 9·63 |
| **LOWER NORTH.** | | | | |
| Port Pirie | 1·34 | 13·82 | 11·82 | 13·21 |
| Port Broughton | 1·43 | 17·03 | 12·97 | 14·33 |
| Bute | 1·67 | 19·27 | 14·12 | 15·42 |
| Laura | 1·87 | 19·08 | 16·33 | 18·22 |
| Caltowie | 2·22 | 17·09 | 15·27 | 17·27 |
| Jamestown | 2·30 | 19·16 | 15·39 | 17·46 |
| Gladstone | 1·90 | 15·91 | 14·23 | 16·00 |
| Crystal Brook | 2·41 | 17·40 | 13·99 | 15·62 |
| Georgetown | 2·04 | 19·20 | 16·38 | 18·32 |
| Narridy | 1·49 | 14·93 | 15·08 | 16·79 |
| Redhill | 2·03 | 19·57 | 15·18 | 16·79 |
| **LOWER NORTH—*continued.*** | | | | |
| Spalding | 2·88 | 22·86 | 17·87 | 20·25 |
| Gulnare | 2·06 | 20·15 | 17·83 | 19·74 |
| BundaleerW.Wks. | 2·50 | 20·99 | 15·22 | 17·29 |
| Yacka | 1·87 | 17·55 | 13·71 | 15·27 |
| Koolunga | 2·00 | 17·97 | 14·30 | 15·94 |
| Snowtown | 2·34 | 21·01 | 14·21 | 15·70 |
| Brinkworth | 2·26 | 20·58 | 13·93 | 15·48 |
| Blyth | 2·32 | 19·52 | 14·75 | 16·34 |
| Clare | 3·36 | 28·96 | 22·03 | 24·30 |
| Mintaro Central | 3·66 | 30·23 | 20·00 | 21·99 |
| Watervale | 3·87 | 32·75 | 24·66 | 27·17 |
| Auburn | 3·06 | 23·76 | 21·95 | 24·25 |
| Hoyleton | 2·19 | 17·13 | 16·15 | 17·96 |
| Balaklava | 1·51 | 14·78 | 14·31 | 16·03 |
| Port Wakefield | 1·20 | 15·21 | 11·91 | 13·13 |
| Terowie | 1·69 | 13·56 | 11·79 | 13·71 |
| Yarcowie | 1·71 | 15·16 | 12·19 | 13·91 |
| Hallett | 1·58 | 15·62 | 14·44 | 16·40 |
| Mount Bryan | 2·26 | 22·25 | 14·19 | 15·73 |
| Burra | 2·58 | 22·27 | 16·06 | 17·82 |
| Farrell's Flat | 2·71 | 21·15 | 17·09 | 18·87 |
| **WEST OF MURRAY RANGE.** | | | | |
| Manoora | 2·43 | 21·09 | 16·30 | 18·09 |
| Saddleworth | 2·22 | 18·58 | 17·65 | 19·69 |
| Marrabel | 2·43 | 25·36 | 17·04 | 18·94 |
| Riverton | 2·06 | 23·46 | 18·44 | 20·48 |
| Tarlee | 1·60 | 18·31 | 15·56 | 17·48 |
| Stockport | 2·11 | 19·70 | 14·15 | 15·89 |
| Hamley Bridge | 2·09 | 18·16 | 14·66 | 16·45 |
| Kapunda | 2·30 | 22·49 | 17·72 | 19·67 |
| Freeling | 2·22 | 20·62 | 15·95 | 17·85 |
| Greenock | 2·26 | 27·37 | 19·15 | 21·46 |
| Truro | 2·76 | 24·16 | 17·78 | 19·74 |
| Stockwell | 2·29 | 23·05 | 18·11 | 20·30 |
| Nuriootpa | 2·18 | 24·37 | 19·03 | 21·25 |
| Angaston | 2·61 | 27·14 | 19·87 | 22·25 |
| Tanunda | 2·81 | 25·18 | 20·04 | 22·28 |
| Lyndoch | 3·94 | 24·15 | 20·81 | 23·01 |
| **ADELAIDE PLAINS.** | | | | |
| Mallala | 1·40 | 15·24 | 15·17 | 16·88 |
| Roseworthy | 2·14 | 18·04 | 15·51 | 17·31 |
| Gawler | 1·96 | 21·40 | 17·29 | 19·21 |
| Two Wells | 1·48 | 16·14 | 14·78 | 16·36 |
| Virginia | 1·56 | 17·95 | 15·83 | 17·58 |
| Smithfield | 1·56 | 18·58 | 15·37 | 17·30 |
| Salisbury | 1·57 | 13·55 | 16·75 | 18·57 |
| North Adelaide | 2·30 | 27·33 | 19·36 | 21·49 |
| Adelaide | 1·93 | 23·65 | 18·96 | 21·04 |
| Brighton | 1·57 | 23·72 | 17·88 | 19·93 |
| Glenelg | 1·44 | 21·07 | 16·57 | 18·35 |

## RAINFALL—*continued.*

| Station. | For Oct., 1916. | To end Oct., 1916. | Av'ge. to end Oct. | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| **ADELAIDE PLAINS—*continued.*** | | | | |
| Magill | 1·67 | 22·39 | 13·27 | 25·69 |
| Glen Osmond | 2·59 | 29·05 | 22·92 | 25·26 |
| Mitcham | 2·23 | 26·27 | 21·39 | 23·47 |
| Belair | 2·41 | 18·16 | 26·15 | 28·64 |
| **MOUNT LOFTY RANGES.** | | | | |
| Teatree Gully | 2·46 | 27·62 | 25·40 | 28·19 |
| Stirling West | 4·74 | 48·56 | 42·76 | 46·70 |
| Uraidla | 4·36 | 48·60 | 40·68 | 44·35 |
| Clarendon | 2·46 | 32·63 | 30·67 | 33·67 |
| Morphett Vale | 1·97 | 23·70 | 21·00 | 23·32 |
| Noarlunga | 2·20 | 22·17 | 18·51 | 20·28 |
| Willunga | 2·42 | 26·62 | 23·85 | 25·98 |
| Aldinga | 1·80 | 21·32 | 18·47 | 20·34 |
| Normanville | 1·42 | 23·25 | 18·92 | 20·65 |
| Yankalilla | 2·00 | 37·69 | 20·97 | 22·78 |
| Cape Jervis | 0·88 | 14·27 | 14·96 | 16·34 |
| Mount Pleasant | 3·66 | 30·86 | 24·57 | 26·87 |
| Blumberg | 3·70 | 32·28 | 26·80 | 29·38 |
| Gumeracha | 3·56 | 34·39 | 30·32 | 33·30 |
| Lobethal | 4·29 | 39·79 | 32·56 | 35·38 |
| Woodside | 3·51 | 31·57 | 29·18 | 31·87 |
| Hahndorf | 3·04 | 31·68 | 32·46 | 35·45 |
| Nairne | 2·58 | 26·52 | 26·32 | 28·83 |
| Mount Barker | 3·41 | 33·20 | 28·31 | 30·93 |
| Echunga | 4·13 | 33·56 | 30·12 | 32·83 |
| Macclesfield | 3·27 | 32·04 | 27·96 | 30·72 |
| Meadows | 4·24 | 40·59 | 32·39 | 35·52 |
| Strathalbyn | 2·05 | 19·28 | 17·50 | 19·28 |
| **MURRAY FLATS AND VALLEY.** | | | | |
| Wellington | 2·10 | 14·53 | 13·29 | 15·01 |
| Milang | 1·92 | 12·58 | 14·57 | 16·08 |
| Langhorne's Brdg | 1·62 | 12·66 | 13·53 | 15·27 |
| Tailem Bend | 2·00 | 14·12 | — | — |
| Murray Bridge | 1·90 | 12·97 | 12·68 | 14·32 |
| Callington | 1·55 | 14·95 | 14·06 | 15·65 |
| Mannum | 2·51 | 12·43 | 10·45 | 11·67 |
| Palmer | 2·44 | 16·23 | 13·86 | 15·60 |
| Sedan | 2·02 | 14·86 | 10·66 | 11·92 |
| Blanchetown | 1·92 | 8·42 | 9·30 | 10·71 |
| Eudunda | 3·31 | 20·80 | 15·42 | 17·33 |
| Sutherlands | 2·84 | 14·47 | 9·24 | 10·60 |
| Morgan | 1·41 | 10·19 | 7·87 | 9·29 |
| Overland Corner | 1·03 | 8·71 | 9·67 | 11·42 |
| Renmark | 1·08 | 10·32 | 9·24 | 10·93 |
| Loxton | 1·68 | 13·60 | — | — |
| **WEST OF SPENCER'S GULF.** | | | | |
| Eucla | 1·98 | 10·22 | 9·04 | 10·13 |
| White Well | 1·25 | 11·12 | 8·15 | 9·67 |
| Fowler's Bay | 1·02 | 13·35 | 11·25 | 12·11 |
| Penong | 0·99 | 8·96 | 10·77 | 11·93 |
| Murat Bay | 1·04 | 13·50 | — | — |
| Smoky Bay | 1·45 | 13·56 | — | — |
| **WEST OF SPENCER'S GULF—*continued.*** | | | | |
| Streaky Bay | 1·16 | 14·87 | 14·25 | 15·31 |
| Port Elliston | 0·92 | 17·16 | 15·38 | 16·49 |
| Port Lincoln | 1·65 | 21·79 | 18·14 | 19·88 |
| Tumby | 1·65 | 14·80 | 13·72 | 15·00 |
| Carrow | 1·64 | 16·46 | — | — |
| Cowell | 1·67 | 10·28 | 10·69 | 11·76 |
| Point Lowly | 1·32 | 10·90 | 10·71 | 12·21 |
| **YORKE'S PENINSULA.** | | | | |
| Wallaroo | 1·51 | 16·75 | 12·83 | 14·05 |
| Kadina | 1·89 | 19·52 | 14·62 | 15·88 |
| Moonta | 1·33 | 19·14 | 13·92 | 15·22 |
| Green's Plains | 1·57 | 18·48 | 14·54 | 15·73 |
| Maitland | 2·29 | 27·02 | 18·34 | 20·08 |
| Ardrossan | 2·04 | 17·47 | 12·66 | 13·89 |
| Port Victoria | 1·56 | 19·89 | 13·84 | 15·20 |
| Curramulka | 1·52 | 19·61 | 17·04 | 18·51 |
| Minlaton | 1·47 | 23·02 | 15·98 | 17·41 |
| Stansbury | 1·81 | 18·95 | 15·66 | 17·06 |
| Warooka | 1·37 | 19·46 | 16·44 | 17·71 |
| Yorketown | 1·06 | 18·99 | 16·04 | 17·47 |
| Edithburgh | 1·34 | 19·68 | 15·90 | 16·48 |
| **SOUTH AND SOUTH-EAST.** | | | | |
| Cape Borda | 1·82 | 23·12 | 23·34 | 25·09 |
| Kingscote | 1·35 | 20·29 | 17·35 | 18·95 |
| Penneshaw | 1·20 | 19·43 | 19·63 | 21·34 |
| Cape Willoughby | 1·91 | 24·19 | 17·63 | 19·69 |
| Victor Harbor | 2·05 | 17·90 | 20·30 | 22·18 |
| Port Elliot | 2·18 | 17·04 | 18·46 | 20·33 |
| Goolwa | 2·03 | 18·04 | 16·21 | 17·93 |
| Pinnaroo | 2·24 | 16·64 | 14·63 | 16·74 |
| Parilla | 1·73 | 17·07 | — | — |
| Lameroo | 1·83 | 17·95 | 14·51 | 16·55 |
| Parrakie | 1·41 | 15·20 | — | — |
| Geranium | 1·90 | 17·76 | — | — |
| Peake | 1·98 | 17·15 | — | — |
| Cooke's Plains | 2·18 | 17·70 | 13·15 | 14·74 |
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## DAIRY AND FARM PRODUCE MARKETS.

A. W. Sandford & Co., Limited, report on 1st November:—

BUTTER.—The weather during the month of October was all that could be desired for the dairying industry. Further rains were experienced throughout the agricultural areas, and production has so increased that the surplus of butter for export is substantially greater than was the case a month ago. The prices of butter in pound prints at the close of the month, in accord with the Federal proclamation, were:—"Alfa," 1s. 4½d.; "Primus," 1s. 4d.; third grade creamery, 1s. 2½d. to 1s. 3½d.; choice separators and dairies, 1s. 0½d. to 1s. 1½d.; store and collectors', 11½d. to 1s. per lb.

EGGS.—The quantities coming forward continue to be heavy, but with the excellent weather that has ruled, and so favored the quality, values have shown very little fluctuation. Interstate buyers and local picklers are still operating, and thus the floors are kept well cleared. Quotations, loose, at mart, hen, 8¾d. per dozen; duck, 10d.

CHEESE.—There is no alteration in this line to report, and though quantities arriving from factories are greatly in excess of those of a month ago, yet with substantial trade both east and west values have maintained, prices being from 7¼d. to 8d. per lb. for large to loaf.

HONEY.—The market is not quite so strong in honey, and values are now 3½d. per lb. for prime clear extracted. Beeswax saleable at 1s. 6d. per lb.

ALMONDS.—Last season's stocks are exhausted, and the new crop has not yet come to hand. Prices nominally, Brandis, 9½d.; mixed softshells, 8½d.; hardshells, 4d.; kernels, 1s. 6d. per lb.

BACON.—Curers have been able to secure sufficient quantities of the live hog, so that local cures of bacon are quite ample for trade requirements. Prices are ruling at a little easier than those chronicled in October. Best factory cured sides, 11½d. to 1s. 0½d. per lb.; hams, 1s. 2d. to 1s. 3d. per lb.

LIVE POULTRY.—Supplies of poultry during the month have been very short, buyers experiencing difficulty in securing anything like trade wants, so that there is no easing in rates, and good prices are likely to rule from now on to Christmas. Heavy weight table roosters, 4s. to 4s. 8d. each; nice conditioned cockerels, 3s. to 3s. 10d.; plump hens, 3s. 1d. to 4s. 5d.; ducks, 4s. to 5s.; geese, 4s. 6d. to 6s.; pigeons, 8d. each; turkeys, from 7½d. to 10½d. per lb. live weight for fair to good table birds.

POTATOES.—Old potatoes, so far as production in South Australia is concerned, are now finished for this year. As the locally-grown crop of new ones is hardly yet ready to dig, the Adelaide market is for the present being supplied entirely from Victoria. Prices have therefore adjusted themselves in accordance with the quotations at the source of supply. ONIONS.—The new season's supply of locals is now available, so the demand for imported old ones is very limited. Quotations:—Potatoes, £9 to £9 10s. per ton on trucks, Mile End or Port Adelaide. Onions, new, 10s. per cwt. in the market; old, £5 per ton on trucks, Mile End or Port Adelaide.

# THE AGRICULTURAL BUREAU.

## CONFERENCE OF HILLS BRANCHES.

The Annual Conference of the Hills Branches was held at Morphett Vale on Thursday, October 13th. There were present, in addition to a large number of delegates, the Hon. R. P. Blundell, M.P. (Minister of Industry), Mesrs. G. R. Laffer, M.P., G. Jeffrey, and C. J. Tuckwell (members of the Advisory Board), D. F. Laurie (Poultry Expert), and H. J. Finnis (Acting Secretary Advisory Board).

### MINISTER'S OPENING SPEECH.

Before declaring the Conference open, the Hon. R. P. Blundell, M.P., apologised for the absence of the Minister of Agriculture (Hon. C. Goode, M.P.), who was in another State in connection with the problems affecting the wheat harvest.

One of the problems producers would have to discuss, he said, was that which confronted Australia in connection with the cause of Empire. He noticed that 369 members of the various branches of the Agricultural Bureau had enlisted for service at the front, which showed that in the great crisis the men on the land recognised no politics or differences. There must be no party or politics, but a recognition of country and nation only. The producers could not shut their eyes to the present situation. Probably, in common with every other section of the community, they would be asked to make greater sacrifices in the future, and spare every eligible man, so that if possible they could take their places in the firing line. It would mean a tax upon production in many cases, and a serious problem, but he asked them to put on one side all thoughts of self, and to realise that any request for additional sacrifices would not be made unless those who made it felt there was a great need for it. He believed the producers would meet all difficulties, and do their duty to the Empire.

### Harvesting the Coming Crop.

He desired to clear up a misunderstanding regarding the gathering of the forthcoming crop. It was said that many of the men on the land had looked upon the proposals submitted to the people as something of which, in the national interests, they were forced to take an adverse view, because they felt that the bountiful harvest that seemed to be assured should be gathered, and that it would be wrong if they did not reap and store the grain for the purpose of feeding not only the people of Australia, but also of their friends who were fighting for them on the other side of the world. No one in the community desired that one bag of wheat should be wasted, or allowed to rot. Men were now being called up for home service, and to take those men and keep them in the camps while it was imposible for the farmers to get the necessary labor to take off the crops would be a criminal action. That was not going to happen, however. Every man who was eligible would be expected to register his name and offer for service, but all who went into camp and were required to assist in taking the crop off would be immediately released until the work was completed. After that they would be expected to return to the camp and later follow their comrades into the trenches. He was not asking the producers to vote one way or another, but self must be placed absolutely to one side. It was for them to do their duty.

### FRUIT FOR THE PEOPLE.

It was of course recognised in South Australia that the wealth of the community depended upon the energies of the men on the land, and that manufactures had been a secondary consideration. It was hoped that there would be industrial expansion in the near future. He referred to the disposal of the fruit crop, and submitted that the scheme devised and carried out last season by the Government in conjunction with a committee of growers, with a view to increase local consumption, was a success. It was hoped that the growers would continue that policy in connection with the coming and succeeding crops. If that was systematically done there was no doubt that in time the local market would prove to be of greater value to the producers, especially in regard to apples, than the oversea markets were. As a result of annual "apple days" the consumption of apples in America and Canada had been immensely increased. After having referred to the obligations of the State in relation to the settlement of returned soldiers on the land, the Minister indicated that steps would have to be taken to open up fresh markets so that the increased production would not become a glut on the local market. In the matter of fruit it was intended to ascertain what the prospects were in the United States, whither at the earliest opportunity a capable man would be sent to mke full inquiries. He thought that last season's apple crop had been marketed satisfactorily. About 100.000 cases had been exported, and on the whole the prices had exceeded expectations. For fruit sold through the Trade Commissioner, 4s. 6d. and 4s. 9d. a case at Port Adelaide, which was equivalent to 2s. 9d. to 3s. in the orchard, had been obtained. The Minister spoke of the necessity for the maintenance of a high standard of quality, and appealed for greater cooperation among the growers.

## THE RURAL POPULATION.

In a paper, "Some Reasons that our Young Men leave the Country for the Towns," Mr. C. Ricks, of the Cherry Gardens Branch, said the man or woman working the land should have the best conditions under which to live, but in many cases the homes they inhabited were of the worst type. That applied not only to the farmer, but to the laborer as well, in the districts represented at the conference. A comparison with the homes and the social conditions of workers in the city would reveal one of the reasons for the people leaving the country for the city. Short leases and high rents also acted in the same direction.

## HAY AND CHAFF.

Mr. H. Pope, of the Mount Barker Branch, contributed a paper on this subject. The uses of hay and chaff were dealt with, and the view expressed that the practice of feeding sheep on chaff would become much more general, as that class of stock did splendidly on it. The production of good chaff presupposed the production of good hay, which would involve the need of clean land and the use of clean seed. In the drier districts the development of wild oats could be prevented to a certain extent by fallowing and cultivating, but in that district it would be found better to sow rape or peas, which would generally ensure a good hay crop, and help to clean the land, to say nothing of the sheep feed provided. Tuscan, Marshall's No. 3, Marshall's Majestic, Crossbred 53, Yandilla King, and King's Early were a few of the hay wheats that did well in that district. He favored sowing a mixture of wheat and oats for hay; Algerian oats and a late variety of wheat would be found to make a good combination. Mixing the cereals in that manner tended to check the development of rust in the wheat, and less trouble was occasioned through takeall. As a general rule, it would be found that the mixed hay would weigh more heavily than wheaten hay alone. Early sowing was recommended, for that gave the young plant a chance to develop before the wet and cold weather set in. Further, the roots prevented the land washing so badly.

Hay that was to be fed to horses or sold, should be allowed to become nearly full in the head before it was cut. Algerian oats, if cut green, had a tendency toward a bitter taste, and were unpalatable to the stock. Wheaten hay for cows should be cut as soon as the bloom was off. Where the binder was used it was essential to see that the sheaves were tied properly. In warm weather wheaten hay could be stooked directly after the binder, but oaten hay should be allowed to lie for at least half a day, unless small stooks were built. Small stooks, however, were undesirable, as wind was likely to overturn them, resulting in the hay becoming bleached, and losing weight. A round stook, with the sheaves standing upright, would be found most satisfactory. Plenty of dry straw should be put down on the site of the stack. It was most profitable to store the hay in a shed. Thatching might answer the purpose, but there was a risk of damage through rough weather. The quality of the hay improved for the first 12 or 18 months, but after that generally there was trouble with the mice.

In regard to the question of chaffing, in the summer months it was found beneficial to toughen the hay before it was chaffed. On small holdings where steam was not available, water could be used with advantage, the hay being damped at least 24 hours before it was chaffed. Prior to being watered, the hay should be stacked with butts up; that allowed the moisture to penetrate the sheaves more satisfactorily. In order that the work might be performed satisfactorily, the hay and the chaffcutter should be in good order, and a good man should be available to feed the cutter. It was a mistake to feed too closely to the rollers, as, in addition to the risk of the operator losing fingers, it was not possible to keep the machine evenly fed. The knives should be evenly set, and care should be given the steels, which should not be allowed to become worn badly. It was advisable to have part of the elevator covered with perforated zinc, in order to provide a means of escape for the dust. As a general rule he preferred cutting the chaff to the middle gauge. One ton was sufficient to cut before the knives were resharpened. He thought the oil engine the most satisfactory power for chaffcutting.

At the conclusion of the paper an animated discussion took place.

## FREE PARLIAMENT.

On the motion of Mr. H. B. Walsh (Port Elliot), seconded by Mr. T. G. Rowe (Inman Valey), it was decided that in future the Conference should be held not later than the 1st October in each year. The next gathering was to take place at Cherry Gardens.

A resolution moved by Mr. C. J. Blakely (Longwood), seconded by Mr. C. Ricks (Cherry Gardens), objecting to the manner in which papers read before Branches were reduced for insertion in the *Journal*, was carried.

## POULTRY.

The Poultry Expert (Mr. D. F. Laurie) gave an address on poultry foods and feeding.

## PIG BREEDING AND FEEDING.

Mr. L. C. Spencer, of the Clarendon Branch, submitted a paper on this subject. He said, "In ordinary circumstances the pig is a very profitable animal. The Berkshire has proved itself to be the best all round breed to keep. It is very hardy, thrifty, and fattens readily. If one desires to market pigs as porkers, a cross with the Essex is advisable. This breed is naturally a good doer. Other breeds, such as York and Tamworth, when feed is taken into consideration, are not so profitable as the Berkshire or the Essex. The selection of a sow is the most important point. One should select a good doer, not necessarily a pure bred. She should be slabby and deep, with not less than 12 teats, and reared from a good milk producing mother. Young sows are most profitable. An old sow may be more careful with her young pigs, but is very often seen with an uneven litter.

There is a danger for the first two or three days of the sow overlying her young. If a rail is placed 8in. or 10in. from the ground along the side of the sty, it will give them a way of escape, as the sow practically always goes down on to her knees and down with her back to the side of the sty. The young boars should be castrated at the age of three to four weeks, and by that time should start to feed, receiving a little milk and pollard (no more than they will eat up clean) away from the sow. At six weeks old they should be weaned. If this is done they will not miss their mother in the least and will not have the slightest check, providing they are fed at least five times a day for a few days and then three times a day till fit for market. Feed them properly from the start, give them all they can eat, then they will eat less and do better. But bear in mind that, however well they are fed, they will not yield the best returns unless they are comfortable, and they must have a good bed. It does not pay to keep a pig about for seven months when it can be raised to the same value in five months. Always keep a supply of charcoal on hand. Mangolds should be grown, as these tend to keep the pig in health. If possible, avoid having a number of pigs to feed during the cold winter months. When it is necessary to buy all feed, pollard is the most profitable. It is a mistake to rear good forward stores and market them, for in a month or six weeks they would double their value. Topping up pays the best. A tip top pig always realises a tip top price.

## THE HONEY BEE.

In a paper dealing with this subject, Mr. J. R. Coles (Longwood Branch) mentioned that the flavor of the honey depended upon the source from which it was gathered. Hives could be manufactured from kerosene cases, by knocking the cases apart, and cutting a rabbet ⅜in. deep, and half the width of the board in the top of each end. That would carry the frames, which should hang at least ⅜in. clear of the bottom board. When the sides were nailed on, a box 9in. deep by 14in. long by 18½in. inside measurement was secured. A weatherproof cover was necessary, and he advocated the use of gable end covers fitting over the hive. If spare hives were placed in suitable sunny spots in the apiary, it would probably result in swarms issuing from parent colonies taking up a place in these. If a swarm clustered on a bush or branch of a tree, it was a good plan to take a frame of brood and honey from another swarm, and place it in a hive with empty frames on either side; then place the hive directly under the cluster and give the branch a violent shake. The bees would generally drop straight into the hive, and should be smartly covered. As soon as they had settled they could be removed to their permanent site in the apiary. The hive should be removed to their permanent site in the apiary. The hive should be visited occasionally, and by moving the frames the bees encouraged to extend the brood chamber. The apiarist should endeavor to equalise the strength of his colonies by giving to the weaker frames of brood taken from the stronger.

## PIGS.

A paper with the heading, "A Few Notes on Feeding Pigs," was contributed by Mr. W. J. Rollbusch, of the Woodside Branch. He took it that the aim of the pig breeder should be to treat his animals in such a way that they would grow into profit as quickly as possible. However, there were many persons who kept their pigs hanging on for two or three months in a half-fed condition, and then commenced to give them more and better food, but in many cases the animals did not develop into the class of stock that could have been expected had they been properly treated from birth. He had noticed a farmer feeding his pigs on a small quantity of pollard, mixed into a large quantity of water. As a result the animals filled themselves, but were unable to secure enough nurtiment to enable them to fatten. Whilst pigs required an abundance of water, it was a mistake to make their food too sloppy. The proportion which he adopted was, say, 6lbs. of pollard to 10lbs. of water; if milk were available a slightly larger quantity was used. Charcoal very materially assisted in promoting the health of the animals. As much of the food as they would eat should be given raw. Mangolds, potatoes, thistles, dandelions, apples, and the like he had cooked and mixed with the pollard, and the growth of the animals resulting from such foods had been satisfactory. It was unwise to mix too much food at one time. The animals would not do well, or fatten quickly if given many apples. A pig, properly looked after, should be ready for market at from four and a half to five months, weighing not less than from 105lbs. to 110lbs. Exclusive of food raised on the property, such as milk and fruit, the cost of feeding per head on his holding had been not more than 15s.

# AGRICULTURAL BUREAU REPORTS.

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* No report received during the month of October. † Formal report only received.
‡ Held over until next month.

# ADVISORY BOARD OF AGRICULTURE.

## Date of Meeting—November 8th, 1916.

# THE AGRICULTURAL BUREAU OF SOUTH AUSTRALIA.

**Every producer should be a member of the Agricultural Bureau. A postcard to the Department of Agriculture will bring information as to the name and address of the secretary of the nearest Branch.**

**If the nearest Branch is too far from the reader's home, the opportunity occurs to form a new one. Write to the department for fuller particulars concerning the work of this institution.**

# REPORTS OF BUREAU MEETINGS.

## UPPER-NORTH DISTRICT.

### (PETERSBURG AND NORTHWARD.)

ARDEN VALE AND WYACCA, October 2nd.—Mr. P. A. Hannemann read a paper entitled, "Ploughs and Cultivators," in which he dealt mainly with the question of providing larger implements. He considered that the four-furrow plough, which was generally used for fallowing, could be increased to six or seven furrows and could be built on lighter lines. In that way more work could be done at the most convenient time. The cultivator could not be enlarged much. In the discussion which ensued, the opinion was expressed that larger implements could be used on even, easy working land, but for uneven land, in which there were stumps or stones, the smaller and stronger implement was essential.

WEPOWIE, September 20th.—Mr. F. W. Roocke read a paper dealing with the care of farm horses. He advocated good stabling accommodation and the feeding of the horses, after the day's work, before giving them a drink. There should be a feeder for every two horses, and they should all be tied up, to ensure each animal having its fair share. Horses should be groomed before their collars were put on. In yoking up all the mane should be removed from under the collar, otherwise a lump would be formed, which would cause the collar to sit unevenly. Collars should fit well, rather too tight than too loose, for in the latter case they caused chafing. If collars were properly attended to, sore shoulders would very seldom occur. Horses should be fed regularly and given occasional changes of food. They should have a dry bed of straw and the stable should be cleaned out every day.

WEPOWIE, October 7th.—In a paper entitled "Odds and Ends," Mr. Jas. Orrock chronicled a number of small savings which might be effected on farms. Couplings, spiders, and whips could, he said, be made from green hide, which was far cheaper than leather and equally as serviceable. Kerosene tins were not only useful as buckets, but by cutting them from corner to corner across the top and bottom and then down the corners and fitting them in a wooden frame, a very cheap and useful fowl trough was provided. If the tins were opened right up and riveted together they made a good wall for a shed. In his blacksmith's shop, a farmer could make S and C hooks, split links, horseshoes, tongs and harrow tines. He could also mend hame hooks, old cultivator shares, when worn too small, could be shaped for the spring tooth and also for hoe tips on the drill. Mr. Orrock produced samples of green hide whips, couplings, &c., and odd blacksmithing jobs executed by himself.

WILLOWIE, August 7th.—Mr. E. J. Kentish read a paper on fallowing, and, after dealing with various makes of ploughs, he said that although experts agreed that deep working preserved the fertility of the soil, the general practice in dry districts was for light working, which he considered best, especially in lands rich in plant food and liable to blight. Early fallow worked up in the spring by harrow and cultvator gave the best results; it made a good seed bed. That was particularly the case in land which had not been cropped the previous year, and had been trodden by stock. Such land usually did not make a good seed bed unless it was worked up early. In the discussion which ensued, members agreed that shallow fallowing was the most satisfactory for that district, from 2in. to 3in. being the depth most favored. Opinion was divided as to whether the cast iron or steel share was preferable, but all favored the stump-jump plough.

# MIDDLE-NORTH DISTRICT.

## (PETERSBURG TO FARRELL'S FLAT.)

### BEETALOO VALLEY (Average annual rainfall, 18in. to 19in.).

September 11th.—Present: eight members and three visitors.

Provision for Lean Years.—As a standby against drought Mr. P. Curtin, in a paper dealing with the provision for lean years, recommended that two years' hay should always be kept on hand, because, in a dry year, there was always an absence of feed or herbage in the paddocks, and consequently the stock would consume more fodder than in an ordinary year. Enough for one year should be stacked in the yard, and the balance built on high ground in the paddock. The stack should be well built, and out of the way of stock, only using it in case of necessity. The other stack should be composed of loose straw, raked up and all dirt well shaken out before carting. It should be fairly large, and placed on a sheltered, solid piece of ground, where stock could always have access to it. In the wet and cold of winter stock would benefit greatly from it, both in shelter and food. When the reaping had been done with a stripper all cocky chaff should be saved, carted into heaps to a spot convenient for feeding to stock, and covered with a good coating of straw. If fed with a little bran all stock would eat it readily and do fairly well on it. It would not pay to save the cocky chaff from the harvester, and it would be better to cut a little extra hay at hay time.

Value of a Farm Orchard.—Mr. J. Flavel read a brief paper on the value of a farm orchard in which he contended that a farmer had not time to tend more than an acre of orchard. Mr. Jacobi considered that no farm was complete without a small garden of 50 trees, which would only require small attention, and would return a profit of £20 or £30.

### BOOLEROO CENTRE (Average annual rainfall, 15.83in.).

August 11th.—Present: 13 members.

Horse Training.—In a paper on the principles of colt and horse training, Mr. W. H. Nottle said it was a mistake to punish a horse for not obeying certain commands or signals which it had never been taught. In training a horse impressions were being fixed on the animal's brain, and by constant repetition they became habits. If wrong impressions were repeated they became what were called bad habits. To the horse the habit was neither good nor bad, but the bad habit was simply a misunderstanding. When a horse shied the first time it was a mistake to punish it, because it then associated the pain caused by the whip with the object which had frightened it, and next time it shied it would be worse than at first. A horse kicked, in the first instance, in self defence, but when often repeated it became a bad habit, and the longer the habit had been permitted the more difficult it would be to overcome. Many bad habits were caused by severe jaw-breaking bits, which deadened the nerves of the mouth, and also by hitching the colt in shafts before it was ready for the lesson. Harsh words should never be used to a colt, and the words used should be such that the animal understood. When breaking the colt a yard 35ft. by 35ft. should be selected, and the animal's disposition should be studied. Every effort should be made to give it confidence. Two lessons should not be given the horse at once, nor two in one day. Dogs, fowls, pigs, and chickens should be kept out of sight whilst the colt was being trained. A 4-ft. pole should be used in poling the colt, and it should be allowed to feel the pole with its nose, which was the most sensitive part of its body. Old or weak harness should never be put on a colt. A four-wheeled gig should be used for colt training, and it should be broken to single harness before double. All habits in a horse were curable, except crib biting, and that was the outcome of a dental disorder.

### CRYSTAL BROOK (Average annual rainfall, 15.62in.).

August 12th.—Present: 15 members.

Poultry Keeping on Farms and in Pens.—Discussing in a paper the relative merits of keeping poultry at large on a farm or in pens, Mr. J. H. Shearer expressed a preference in the first place for pure breeds as against the barndoor fowl, and he strongly favored the Silver Wyandottes, because they were hardy, matured quickly, and were fairly heavy birds, with a fine quality flesh. They were an ornament to the farmyard, were among the best winter layers, and the weight of their eggs was very little below that of the White Leghorn. They were good brooders and, if not required for that purpose, could be easily put off, and would come on to lay again very quickly. Next to the Silver Wyandottes he favored the Rhode Island Reds, which were similar in habits and size, and were very beautiful birds. Regarding the relative merits of keeping fowls in the open and in pens, a competition termed the "no house test" for hens had been in progress since April 1st. Six breeders were competing with 12 birds each, six being housed in the ordinary way, and the other six being allowed to roost in trees. Despite several days' rain, and nearly a fortnight of frosts, every pen of the "no house" birds had laid more eggs than those in comfortable quarters. The total of the latter for two months was 322 against 689 laid by these subjected to the fresh air treatment. The leading pen in the "no house" test had laid 262 eggs and the nearest approach to that by a pen in a house was 213 eggs. In spite of the disposition of the White Leghorns to fly and to lay their eggs in out-of-the-way places, they would pay handsomely in scratching sheds, as recommended by Mr. D. F. Laurie, the Poultry Expert. A shed 100ft. by 16ft. divided into five compartments would carry 500 fowls, on the scratching shed principle. White Leghorns crossed with Silver Wyandottes produced a nice plump bird, mostly white, with rose comb, which always added to its weight appearance, and made it a good market bird. One of the most important items in keeping poultry was to maintain a plentiful supply of clean water, which should be kept in a cool place, and never permitted to become stale.

## MINTARO.

August 12th.—Present: 22 members and one visitor.

Farming on a Two-years System.—In a paper supporting the two-years system of farming, as against the three-years system, Mr. P. C. Jacka said that he would consider a farm of 420 acres in that district too valuable to be farmed on the three-years system. It could be profitably operated by cropping 200 acres each year, taking 160 acres for wheat, 20 acres for oats, 10 acres for barley, and 10 acres for peas. Ten acres each of wheat and oats and the roads could be cut for hay, and the remainder harvested. After harvest anything from 40 to 80 acres should be burned off. The remainder he would burn off and fallow at the usual time. Then, if possible, he would cultivate it and sow various green fodders, such as fast-growing varieties of barley, namely, spring, Pryor, greenfeed, or Cape or Algerian oats, provided that there was any takeall in the crop. When the fodder had come on sufficiently he would buy store sheep, fatten them, and quit them in September. Then he would plough in the fodder as a green manure. The cost of treating land in that way would not be heavy. About 30lbs. or 40lbs. of superphosphate and 1bush. of barley would suffice and would pay well for the work involved. That would pay better than allowing all the land to lay out as bare fallow, and a nice profit could be derived from side lines by feeding the surplus barley and peas to pigs and other stock.

Cropping once in Three Years.—In a farm of 500 acres, allowing 20 acres for a homestead, garden, and keep of cows, Mr. I. A. Jacobs, in a paper on cropping once in three years on a 500-acre farm, said that the balance should be divided into three paddocks of 160 acres each. That would give 160 acres of stubble, 160 acres of fallow, and 160 acres of wheat. The stubble land, as a pasture for sheep, would return more for the labor expended upon it than 160 acres of wheat. To make a just comparison between the two-years and three-years systems they should judge by results. The 160 acres of wheat, should, on the three-years basis, return 25bush. per acre, which would be 4,000bush. At 3s. per bushel that would be £600. From that amount there had to be deducted for seed, manure, and labor, 30s. per acre, which totalled £240, leaving a net balance of £360 as the return from the wheat crop. On the 160 acres of stubble and the feed on the fallow, 150 ewes could be kept, and they would rear 125 lambs. The ewes should yield in wool 8s., or £60 in all. For the lambs £100 would be received, and 25 sheep should be allowed the farmer each year for meat. The wool from the lambs would pay for the labor of attending to them. The total yield from crop and sheep would be £520, and it would be less labor to fallow 160 acres and tend the sheep than it would to fallow 240 acres and keep it clean. On the two years system there would be 240 acres of crop every other year. From such an area 15bush. would be a good crop. That would yield 3,600bush., which, at 3s. per bushel, would be £540. Deducting £360 (30s. per acre) for seed, manure, and labor, the net return would be £180, leaving a balance of £340 in favor of the three years system. By cropping the smaller area and keeping sheep, less labor would be employed and the work would be more evenly distributed through the year. An allowance of 25 sheep for meat for the farmer had been made in the three years system, but in the shorter term the supplies would have to be purchased. Mr. Wright preferred ploughing the stubble in to burning it. Mr. Jacobs estimates were too high. Mr. Jacka said that 150 sheep on 160 acres of stubble was too much. Mr. A. Sandow found the two years system of farming most profitable, but agreed that sheep were a splendid asset on the farm. Mr. John Thomas said that the two years system on the red clay land had a tendency to make the land run together. Mr. E. A. Scarfe said that to justify the three years system it should be proved over a number of years.

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### NORTH BOOBOROWIE (Average annual rainfall, 16.35in.).

October 9th.—Present: 10 members.

**Romney Marsh Sheep.**—Discussing the Romney Marsh breed of sheep, Mr. F. E. Waddy, in an interesting paper, said that it was the only breed which thrived on the wet, cold, boggy land of the Romney Marsh in England. They were able to resist footrot and other diseases which boggy pastures tended to produce. There were many other characteristics in the breed which rendered it suitable for the production of fat lambs in that district.

**Pure Merinos.**—Mr. A. V. Simpson read a paper advocating the use of pure Merinos for the fat lamb industry in that district.

**Sheep on the Farm.**—It would pay to buy sheep at present, dear as they were, contended Mr. S. E. Mudge, in a paper on sheep on the farm, rather than wait until they were cheap. If at the present time a start were made with 50 ewes, the outlay would be £75. Two rams, one at £10 and one at £5 would bring the total investment to £90. With reasonable care 80 per cent. of lambs should be reared and they should realise at least £50 by next August. The wool next year, at 10s. per ewe, would mean another £25, or a total for the year of £75, leaving a debit of only £15 on the money invested, and against that there was the flock of sheep. If young ewes were bought, a flock could be obtained which would last three years at least, and they should rear in three years, 200 lambs. That was allowing for 80 per cent. droppings and five lambings in the three years, or seven months between each lambing. He recommended the use of two rams, in order that the lambings might take place as nearly as possible at the same time. The higher priced ram should be used for the first two or three weeks and then both for several weeks. Judgment would be required to decide how many sheep should be kept, but with 10 acres of lucerne, 50 ewes could be maintained. On the figures given, from 50 ewes £325 could be obtained in three years. He advocated using large framed, well woolled Merino ewes and the Leicester ram. By using the Merino ewe, perhaps a lower price would be realised for the lambs, but more for the wool, and much would be saved in fencing and worry. The Leicester was of special utility where hand feeding was resorted to. The animals grew and matured quickly, and a lamb four months old would weigh, when dressed, between 50lbs. and 60lbs. They had very small heads and were great foragers. Their wool was long and silky and a fair sheep would cut from 10lbs. to 12lbs., but they were not valuable as wool producers, their chief excellence being for raising fat lambs and mutton. Mr. H. A. Mayfield was averse to the use of the Merino alone for the production of fat lambs. In that district he had not been able to fatten a lamb under six months, whereas he could produce a Crossbred lamb weighing from 40lbs. to 45lbs. in 16 weeks. He preferred the Crossbred ewe for producing fat lambs, the Merino being unsuitable in flat country owing to its liability to footrot.

### REDHILL (Average annual rainfall, 16.79in.).

September 14th.—Present: 11 members.

**Mixed Farming.**—In a paper on this subject Mr. G. A. Button said that a farmer would not lose all his harvest by a visitation of frost, hot wind, rust, or other diseases which attacked a wheat crop if he carried on mixed farming properly. Mixed farming should be conducted on systematic lines with a definite object in view. Oats and barley should be grown as well as wheat, because they made good fodder when fed green or could be harvested and fed to stock to great advantage in winter time when green feed was scarce. More corn might profitably be used for feed and then less hay would be required. Feed not needed when green could be put into ensilage. Enough stock ought to be raised to maintain the flocks. The majority of mares on a farm would do light work and rear a foal. Several paddocks should be provided for sheep in order to give them a change. It would pay to hand feed sheep when green feed was scarce. Sufficient pigs should be kept to supply the home with pork and bacon. Dairying also deserved to be considered, because cows, with fair treatment, would give a fair return. The most profitable line of all, considering the small amount of trouble involved, was poultry, whether reared for the market or egg production.

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BOOLEROO CENTRE, September 15th.—Mr. G. R. Hein read a short paper on cows on the farm. In the first place he advocated the conservation of cocky chaff and straw in good seasons to be fed to cows in the bad seasons, at the rate of two double handsful of crushed oats to each animal. A few acres of oats should be grown each year; they yielded well and the straw could be stacked and saved to feed to the cows with an equal quantity of hay chaff. Even in the drought year, cows fed in that way produced enough butter for the homestead and some over for the market. He preferred the Jersey for butter purposes, but the offspring of a Shorthorn-Jersey cross would be a hardier animal and better for milk and beef. A farmer with 640 acres should be able to keep four cows all the year round. Cows turned out at night kept much cleaner than when stabled. In the discussion which followed, the opinion was expressed that, although the district was not a dairying one, it was essential to keep a few cows to supply the homestead with milk and butter and provide food for the rearing of calves and pigs.

BUNDALEER SPRINGS, September 13th.—Mr. S. H. Ellis read a paper on "Keeping Farm Accounts," in which he outlined a system which he considered could be adopted with profit, and he made the subject clear by illustrations on a blackboard.

CANOWIE BELT, October 2nd.—A paper on the care of farm horses was read by Mr. C. Davis. He urged that horses should be well stabled and fed, and that, when they were brought in from a spell, they should not be given a heavy day's work at once, but should be accustomed gradually to the full effort required of them. After working a couple of hours, a five minutes rest was very beneficial. An hour's feed should be given horses before going to work and they should have an hour and a half in the middle of the day. Kindly treatment for horses was essential. Discussion followed, in which the views of the writer of the paper were agreed with.

HILLTOWN, September 1st.—In a paper on beautifying the home, Mr. O. R. Dinham advocated a careful selection of the homestead site, and the building of the best homestead possible under the circumstances. Trees should be planted of such different varieties as to make an attractive appearance and in localities which would improve the scenery and afford shelter to the animals during the summer months. A wall with fancy iron work should be erected on the back and sides, and in front a stone wall about 15in. in height with pickets on top, and a suitable hedge planted inside. That would give a fine appearance and afford shelter to the growing plants in the garden. All waste materials lying about the outbuildings should be collected and stacked in a tidy heap. Good fences and gates also helped to make the homestead beautiful.

MOUNT BRYAN EAST, September 16th.—Mr. A. Doyle delivered an exhaustive address, illustrated by lantern slides, on the bulk handling of wheat. A long discussion followed. Mr. F. Thomas read a paper on "Colt Breaking" from the *Journal of Agriculture*, and considerable discussion followed.

## LOWER-NORTH DISTRICT.

### (ADELAIDE TO FARRELL'S FLAT.)

### JULIA (Average annual rainfall, 18in. to 19in.).

September 8th.—Present: 12 members and two visitors.

Thatching Haystacks.—Two papers on thatching haystacks—one by Mr. R. H. Cooper, of Riverton Branch, and the other by Mr. R. Bagster, of Salisbury

Branch—were read. Mr. R. H. Cooper declared that it would pay to put a good covering over the stacks as soon as possible after they had settled down, and the best covering and most effective in every respect was a good thatch. It was well to have sheaved straw of even size, which should be thrown off around the stacks, and there should be an abundance of sticks about 3ft. long—young wattles were very suitable, and held better than palings. They should be sharpened. It was necessary to have six sticks about 18in. long on which to wind binder twine; the number depended on the length of the roof. A small rake also was required. The straw needed to be wetted to make it set properly. A good plan was to have a trough to dip the sheaves in. If the stack was not very high, the sheaves could be tossed on to the stack to the left of the ladder. The ladder should be securely placed with an iron peg at the bottom. A row of sticks should be placed in the roof of the stack parallel with the ladder and sufficiently wide apart to take two rows of sheaves. The first two sheaves should be placed with the butts down in order that they should hang just over the eaves. The bands should not be cut. The remaining sheaves in each layer should be put with the heads down, lapping them half over and cutting the bands. Care should be taken to make the thatch as even as possible. When the layer had been completed, it should be raked down with the small rake. The raking and tying down should be continued as the operations proceeded, about every two or three feet. It improved the appearance to clip the bottom of the thatch with an old pair of shears. In thatching a shed, there was no body of straw to hold the pegs, and small galvanized wire was used instead of binder twine. An iron needle was required to pass the tying wire through the thatch, to be secured around the beams of the roof. Mr. Bagster, of Salisbury, in his paper, observed that straw was most generally used for thatching, though there was growing near the sea a wire grass which made a splendid thatch that would shed water as well as 3in. of straw. The straw should be sheaved and bound loosely, because it made in that way a better sheaf. Pegs should be 2ft. 6in. in length and cut from bamboos or palings. Suitable pegs could be made from artichokes, the rough stems of which made a good hold in the straw. If hay were held for more than one year, it was advisable to examine the roof to ascertain whether the ravages of mice, etc. had rendered it necessary to re-cover the stacks before another winter. In the remainder of the paper the writer emphasised the same points as the previous paper. Mr. A. Pfitzner considered that thatching entailed considerable labor. Some members considered that a good job could be made with the old system of putting loose straw on the stacks and holding same down with wires and netting with weights. Messrs. D. S. Heaslip and O. B. Pfitzner considered that square ends were most suitable for stack building. Mr. C. Nash preferred rounded ends because they were less liable to slip.

### NORTHFIELD (Average annual rainfall, 19in.).

October 11th.—Present: nine members and one visitor.

Scrub Farming.—It was well to start with a plan, premised Mr. A. Berg, in a paper on scrub farming, and therefore it was necessary to place the homestead in the most suitable and convenient position and secure a good water supply. Having cut roadways for the roller and rolled down the scrub, preparations should be made for burning off by making fire breaks all round the portion which had been rolled. Usually the breaks were three chains wide. The best time to roll scrub was in September or October, because the wood had time to dry before the burning season. A day when a steady north wind was blowing should be selected for burning. It was essential to have a good burn, because it was waste of labor and seed to sow a badly burned ground. No more scrub should be rolled than could be properly kept under control, because if the fire broke into the standing timber, the cost of clearing that land could be safely estimated at 10s. per acre. Cutting two and three year old shoots did not pay, and land that had to be let go was worse than virgin land to deal with. A good stubble burn was a great labor saver, because it killed the shoots and reduced the work of slashing. The firerake was essential, because every possible means of scorching the shoots should be taken. Three good burnings would kill most of the stumps. For the first year a cultivator should be used, because it did not pull out many stumps, the proper time for that operation being when fallowing, for then they could be picked up and carted out of the way. Mallee land should not be cropped three years in succession, because of the danger of takeall. For the first year 45lbs. of wheat and 50lbs. of super. to the acre should be sown and in the following year, the same quantity of wheat and 75lbs. of super. The land should not be worked deeper than 3in., but 2in. was deep enough after a good burn. The most suitable implement to use was the disc plough, because it did not gather rubbish and would run over sticks as well as cutting or dragging off many shoots. For a seed coverer, mallee branches (renewed twice a day) should be attached by fencing wire to the back of the drill. If a good burn off were not secured, it was better not to put a crop in, but to clear up the rubbish and put the land in fallow. There was no natural feed for stock in the mallee until after a fire, when spear grass grew in abundance.

## RIVERTON (Average annual rainfall, 20.48in.).

July 10th.—Present: 24 members and 50 visitors.

GARDENING TO BEAUTIFY THE HOME.—In a paper entitled "Gardening with respect to the Beautifying of the Home," Mr. H. A. Davis contended that every home, whether in the town or on the farm, should have its garden plots, flower, vegetable, and fruit garden, and on the farm, tree plots. First, in regard to flowers, the enclosure around the home should be securely fenced with wire netting, pickets, or something that would keep out all farm animals. All gates should be self-closing. The beds should not be too large, 10ft. square well kept being much better than a large patch partly neglected. The beds should be well dug, mixing in as much well rotted manure as possible. The beds should be at least an inch or two below the paths. It would be necessary to remove some of the soil, but not the top soil, as he preferred to remove some of the subsoil, more especially if it were limestone or stiff clay. Before planting a border of, say, 4in. by 1in. jarrah should be placed around each bed. The paths should be filled with gravel, limestone rubble, or anything procurable, and rolled down nicely. For planting he preferred roses and shrubs, with say a shrub or palm centre, and a rose at each corner. The rest could be filled up with annuals in their season. The success or failure of a flower garden was in the laying of it out and the preparation of the soil. If that were not well done, there would be very little success. All weeds should be rigorously kept under by going round the garden at least once a week, and it would not take many minutes after the first year or two, if nothing was allowed to seed. Flowers, if allowed to seed became weeds, and gave a lot of trouble. Every home should have a kitchen garden. As soon as rain fell plants should be raised ready for planting out, such as cabbage, cauliflowers, turnips, lettuce, onions, &c., in small beds or boxes near the tanks, because they would need plenty of water. It was also as well to prepare a plot of ground for the next year by well manuring it and keeping it clean, which would save a lot of weeding. The land would be ready to plant at any time, and the manure would be well mixed in the soil, and give better results, besides paying well for the attention. Small plots of each variety should be planted and repeated every two or three weeks, so that they would not all come in at once. He advised sowing a good bed of rape, because it was an excellent vegetable. For a fruit garden, further than planting two or three trees of each variety, say, apple, plum, quince, lemon, and pear, he would not advise much in the fruit line. In that district fruit could be bought much more cheaply than grown. The only fruit grown to profit there were apples, quinces, figs, and lemons, especially the latter; two trees producing all that could be used. Tree plots on the farms were the most important of all. It had been a great mistake to remove all the great trees from most of the farm paddocks, and the sooner they were replaced the better. There should be two or three trees in every paddock and at the corners, but two to four trees standing out in the paddock, so that the stock could gather around them in very hot or rough, cold weather, would be a great advantage. On many farms there were stony patches, or land washed with creeks, which was of very little use, and it would pay to fence and plant some of them. It did not take a very large piece of land to hold 100 trees, and it did not take long to plant them. The greatest item was to fence securely, and sheep-proof any plots before planting. In the small plots in paddocks for shelter, he preferred the red gum before the sugar, as they grew more bushy, giving more shelter, and a better shade. If sugar gums were planted a pepper tree should be planted between, because they grew well, and made a splendid breakwind.

## ROSENTHAL.

September 13th.—Present: 34 members and two visitors.

Harvester v. Stripper.—A paper was read by Mr. G. C. Heinjus for the purpose of demonstrating the many advantages of the harvester in comparison with the stripper. The most notable advantage was its labor saving propensities, and that fact should not be overlooked in the coming harvest, because, as was the case last harvest, men would not be plentiful. Some people contended that the harvester did not produce a good and clean sample, but that was not his experience. With a good team, and an even pace, he failed to see how it could be otherwise. Although he ran all his seed through the grader, there were many bags which did not produce a teacup of whiteheads and husks, and that in a 12bush. crop, was excellent. He had used three horses at times and they worked the harvester fairly comfortably, but that was because the ground was level and of a reddish nature. The cocky chaff, which was so much esteemed, was easily caught by placing a couple of old binder canvasses in position under the machine. The harvester did not crack the grain as most strippers did. Harvested grain was quite free from stones, gravel, and dirt, which found their way into the bags stripped by the ordinary machine. There was no wet or musty smelling wheat from the harvester. The harvester was so well constructed that there was very little wear considering the work it performed. He had harvested 800 acres and had not had a break of any kind. The machine did not waste the grain as the ordinary stripper and winnower did. The harvester pulled quite straight, which could not be said of all strippers. It could be started much earlier than the stripper.

## SALISBURY (Average annual rainfall, 18.57in.).

September 5th.—Present: 12 members.

Wool Classing.—Mr. Gordon S. Jenkins, in a paper dealing with that subject, said the object of wool classing was that when the wool was put upon the market the buyer might see that each lot was an even type of wool for which, knowing what he was buying, he would give top price. Before being placed on the classing table a fleece should be skirted, in order to make it uniform in length and quality. When thrown on the table the fleece should be pulled out flat, and skirting should be commenced behind the point of the shoulder and the sweaty edges removed with the fingers. After working in that way to the top knot and collar, the other side should be treated, back to the starting point and then around to the lower part of the breech, taking off the edge of the belly wool, which was usually left on the fleece. Then the tail should be treated, removing particularly all staind wool. After all the rough edges had been separated from the fleece the sides and ends should be folded over a few inches. Then the side farthest away from the classing table should be given a short fold. Then the fleece should be placed right over on the edge nearest the table and rolled from the breech to the shoulder, which would leave the best of the fleece—the shoulder—exposed. The staple should then be tested by holding it tightly in the thumb and forefinger of each hand, and clicking it with the second finger, to see whether it would break or not. For a small flock of 200 or 300 the tender wool should be placed with the short wool, but with a nice-sized flock it should be kept by itself. The AA, or first grade wool, should be the longest, brightest, and most attractive of the fleece wool, and light in condition. The A grade should include those shorter in staple, heavier in condition, and less attractive to the eye. The skirtings of the fleece should be made up into three lots, namely, (1) the longest and brightest of the skirtings; (2) the sweaty trimmings of the first pieces or any short-stapled pieces, and the stained wool (which should be dried before bagging or baling) ; (3) the table locks and floor locks, though in a big flock these might be kept separate. In big flocks of a few thousand sheep, the classes generally were as follows:—AA, fine, long and bright wools, light in condition; A, shorter in staple, heavier in condition, and therefore less attractive looking, and, if anything, a little finer; BB, long, bright and attractive, but more shafty and coarser in character; B shorter in staple than BB, heavier in condition, and less attractive; CC, very fine, heavy conditioned, fatty fleeces. For tender wools there might be many or few classes, according to the size of the flock and the class of wool grown. Crossbreds and long wools were classed on length and quality only, condition not being taken into consideration. The counts of crossbred and long wool ranged from 28 to 58, and for Merinos from 58 to 100. In a farmer's flock of 200 or 300, either Merino or Crossbred, it would only be necessary to make two classes, the long, bright, and attractive fleeces being for AA grade, and the less attractive for A grade. No amateur should attempt to classify a big flock, because it was very easy to run one class into another where five or six grades were being made. It was necessary to remove all stains from the fleece and pieces, and keep the rolling table free from locks and second cuts. The floor should be kept clean, so that the skirtings should not be trodden upon, and the board should be swept after each sheep had been shorn. In answer to questions Mr. Jenkins said that it would pay to class the wool of farmers' flocks of 200 or 300 sheep, because it would mean an increase of 1d. or 1½d. per lb. He preferred blade-shearing unless the clippers were in good order and worked by a capable operator, otherwise wool was pulled out, and contusions were made.

TWO WELLS (Average annual rainfall, 16.31in.).
August 14th.—Present: eight members.

Fencing.—''Where sheep are kept it is advisable to put in five plain wires with one barbed wire on the top,'' observed Mr. L. A. Cordon in a paper on fencing. In erecting a fence, it was first necessary to obtain pegs for a line and then posts and strainers, and bore them with a ⅝in. bit. The barbed wire should be laid out and strained and fastened to wooden posts. Iron posts should then be driven in. He recommended a fence with wooden posts 12yds. apart, with three T irons in between. When the barbed wire had been fixed the plain wires should be put in, commencing at the top. The top two wires should be No. 6 gauge and the others No. 8. Strainers should not be more than eight chains apart, because of the difficulty of keeping the wires tight in a long strain. The wooden posts should be 5ft. 6in. in length, and set 2ft. in the ground. Strainers should be at least 3ft. 6in. in the ground, and those at angles and at the end of the line should be strengthened with struts. Gum and mallee made the best posts, because, if solid, the white ants were less likely to attack them. Where sheep were not kept it was best not to have more wires than necessary, but where horses and cattle were kept there should be two barbed wires on top and one or two plain wires below them. In that case the wooden posts should be closer together, with two good strong iron posts between. All posts should be divested of bark before being put in the ground.

NANTAWARRA, September 14th.—Mr. A. F. Herbert read a paper in which he discussed the question whether it would pay a farmer to breed up a flock of sheep, and he arrived at the affirmative conclusion. He favored the Merino as a farmer's sheep, because it was quiet and was not severe on the fences. The Merinos gave a good clip of wool, produced a fair lamb, and yielded when killed as much mutton as Crossbreds. Mr. R. P. Uppill said that Merino sheep might be all right just now, but in ordinary times it was better to produce Crossbreds for market. More might be done in hand feeding than was done at present. For that purpose he preferred Crossbreds owing to their quiet nature; Merinos being timid did not do well. Graziers should be allowed to do the breeding for stocking, and it would pay the farmers to buy ewes from them rather than wait two years. One good lambing would supply the country again. He favored the Merino and Border Leicester cross mated with a short-woolled ram, because the progeny provided the best export lambs. Mr. P. Nottle preferred Crossbreds, and considered that more hand feeding should be done. Every farmer should breed a few sheep. It would take two years for the supply to come up to normal again. Mr. T. Dixon said that, even at present prices, it would not pay to breed Merinos on the farm. The Crossbred was the most profitable on small holdings. Hand feeding would be a great advantage at the beginning of winter.

NORTHFIELD, September 5th.—Mr. A. Sandercock read a paper on farming in the North, in which he discussed exhaustively the methods adopted in the districts of Hookina, Hawker, and Quorn in the North, Ports Germein, Pirie, Broughton, and Wakefield on the west side, Orroroo, Petersburg, and Mount Bryan on the east, with Balaklava, Mallala, and Riverton on the south. He dealt at length with the system of pickling wheat and sheep and pig farming.

STOCKPORT, October 6th.—Mr. K. Whitelaw opened a discussion on the question, ''Can we cultivate, manure, and sow in one operation?'' At present, he said, two machines, two teams, and two men were required to carry out work which, in his opinion, could be executed by one machine. By drilling in seed and manure they were wasting ground, because the seed and manure were in one row and there was at least 7in. of ground to the next row with no seed between. When the seeds reached out they were to a certain extent, away from the manure, which was practically wasted. In sowing before the cultivator, the seed and manure would be more evenly distributed. If it were necessary to sow even 2bush. to the acre, that would not be too much, if evenly distributed. If they could only save one horse and a man something definite would be accomplished.

## YORKE PENINSULA DISTRICT.

### (TO BUTE.)

### BRENTWOOD.

September 7th.—Present: 15 members and five visitors.

Mixed Farming on 1,000 Acres.—Assuming that the holding of 1,000 acres was all arable land, Mr. H. L. Martin, in a paper dealing with mixed farming on that area, said that he would divide the land into 10 paddocks of 100 acres each, and fence with posts and six wires. Mixed farming could not be carried on satisfactorily with only some of the paddocks sheep proof. There should be, if possible, a water supply in each paddock, an arrangement which would be found of great value. Four of the 100 acre paddocks should be cropped each year, and three should be fallowed, leaving three for feed. In that way there would be three paddocks for wheat on fallowed land; one stubble paddock should be burned and cropped with oats and barley, say 50 acres of each. In an average season the oats could be cut for hay, and would be sufficient for the requirements of the farm. One stubble paddock should be burned and sown with Cape barley or some other suitable forage crop. Hay stubble should be sown with barley or oats, as generally it grew very little feed of itself. In regard to stock, from 250 to 300 sheep could be kept. Cows were also worthy of attention, where the family was sufficiently large to attend to them without hired assistance, but two or three should always be kept for household purposes. Pigs were a profitable side line, more especially where cows were kept and the family was large enough to attend to them. Poultry, if rightly managed, was one of the most profitable side lines of the farm. About 100 fowls would be sufficient, and would find most of their living for themselves about stack yards and stable. Every farmer should aim at breeding sufficient horses for his own use. Mr. F. Nation was averse to permitting poultry the run of the stables and haystacks, because they spoiled too much feed. They should be shut up and fed. Mr. Hagger said that the method outlined contained too many fences, which were expensive to construct and keep in repair. Mr. C. Boundy supported the small paddock suggestion, because stock did much better when changed about. Mr. Newbould advocated more barley and less wheat.

### MINLATON (Average annual rainfall, 17.46in.).

September 8th.—Present: 12 members and two visitors.

Destruction of Rats and Rabbits.—In a paper dealing with a pest of rats and his method of destroying them and rabbits, Mr. A. D. McKenzie said that he had tried various poisons upon the rats, with no apparent effect. Large baits made from phosphate rabbit poison, sprinkled over with a little pollard and placed in tins, did not give any practical result. Subsequently, however, he dusted the bottoms of the tins with the pollard, broke the large baits into sizes little larger than a pill, dusted them over with the pollard, and used them. The result was very satisfactory, a large number of rats being destroyed. The few remaining had become very cunning. His experience was, that it was inadvisable to lay the poison for more than a couple of nights at a time. It should then be removed and fresh baits laid in a week or two. Baits for rabbits should be dropped into a garden hoe furrow, around the stump heaps or burrows. A little bran should be mixed with the pollard used for the baits. The baits should be renewed every few days. Members generally agreed that phosphate and pollard would keep rabbits in check if properly dealt with.

# WESTERN DISTRICT.

## CUMMINS.

September 16th.—Present: nine members and two visitors.

**Grazing in Cummins District.**—The condition for growing grain crops in that district, remarked Mr. H. Hancock, in a paper on "Grazing in the Cummins District," had proved unsatisfactory, but it was suitable in many ways for grazing, and was a very healthy place for stock in spite of feed being scarce. The new land in that district usually grew a fair crop, but, after that the crops, owing to the lack of organic matter in the soil, were light. The best method to replace organic manure over a large acreage was to run stock—particularly sheep—upon it. It was necessary to grow the feed by cultivation. A crop could be grown with super., for preference a cereal which would develop readily and grow quickly again after having been eaten off, in that manner giving as much green feed as possible in a year. A paddock of 200 acres would keep many sheep in good order, there would not be the work and expense of harvesting and buying bags, and the sheep would return to the soil a large quantity of organic manure, and probably be as profitable as wheat off the same land. Even if there were a small loss, it would be more than equalised the following year because the land, treated in the same way, would grow double the feed and carry double the stock, which would return double the manure to the land and yield double the profits with the same cost of sowing. After that, the land would produce good crops of wheat, and that was where the profit would come in if it did happen that the sheep in themselves were unprofitable. In that district they had been cropping the land year after year, taking everything out and putting nothing in, with the result that the land was, if anything, worse than when they commenced. If they had run sheep on the land it would have been good after three years. Most farmers could treat 200 acres in the way he had indicated every year, and they would soon have 1,000 acres of good land. He recommended rye for grazing, because it came early and grew quickly after being eaten off. Besides that it kept shooting up green very late in the year if fed down, but it was of little use as feed if permitted to come out in head. Oats were cheaper to sow, but did not grow quickly, and stock did not like them until they came out in head, after which they were excellent food. Kale made excellent feed, and one sowing did for three years. Should it be intended to keep the land for grazing for a number of years, grass seeds should be sown with the crops, and in a year or two would be thick all over the land, providing feed without sowing. It should be a grass which would be green in summer, because that district, owing to the moisture remaining in the ground until the middle of summer, would be suitable for it. Mr. Blutcher agreed with the paper. He suggested oats as a good fodder. Mr. E. Slater said that barley was a better fodder than rye. Mr. J. Drudin preferred oats because of their hardiness, not being affected by the wet conditions of the district. Mr. R. Hamilton preferred oats to barley or rye.

**Pig-raising.**—Mr. W. P. Bartley read a paper on pig-raising, in which he advocated running pigs in a small paddock, and sty-feeding them at the last, because a better quality meat was produced. The sties should be in a well-drained position, and dry bedding should be provided when the weather was wet and cold. Pigs should be given a change of food, and plenty of exercise if they displayed symptoms of rheumatism. Milk and pollard made good food for growing pigs. Soaked oats made excellent food, and was cheap. All grain should be soaked in preference to being boiled. Jerusalem artichokes were fattening feed for pigs, which could be turned into the crop, except at such time as was necessary for the plant to re-establish its growth. Mr. W. Siviour was afraid that pig-raising in that district might be overdone because of the distance from market and the difficulty in transporting pigs to Adelaide in good condtiion.

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## ELBOW HILL (Average annual rainfall, 11in. to 12in.).

September 9th.—Present: 14 members.

**Cows on a Farm.**—Regularity in feeding and milking were insisted upon by Mr. S. V. Wake, in a paper dealing with the keeping of cows on a farm, as two essentials for securing the greatest profit from the dairy herd. The cows should be fed whilst milking. A small paddock of wheat or barley, into which to turn the animals at night was most profitable. After milking in the morning they should be put into the grazing paddocks. Where there were only three or four cows on a farm, separating was necessary only once a day. The evening's milk should be set in pans, skimmed in the morning, and then heated slightly before being run through the separator. The cream should be allowed to cool thoroughly before mixing with the cream from previous days. The two great drawbacks in that district were the absence of stud bulls and the distance from market, and in consequence the herds were deteriorating. Mr. A. C. Chilman considered that sheep, pigs, and poultry were more profitable on a farm than dairying. Mr. R. S. Mills said that cows, if well cared for, were the most profitable side line. Mr. G. F. Wake agreed with the views expressed in the paper. Mr. H. J. Wheeler insisted upon the importance of feeding, and it was essential that the cow should have as much water as she required whenever she wanted it.

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### GOODE (Average annual rainfall, 12in. to 13in.).

September 16th.—Present: eight members and one visitor.

**Educating Farm Horses.**—Papers dealing with this subject were contributed by Messrs. P. Hunt, H. Smith, and H. L. Will. Mr. Hunt advised bringing the colt quietly into a yard, and if necessary catching him by means of a crush pen. It should always be borne in mind that the station bred colt associated fear with human handling; consequently the first point was to allay that feeling. After the animal had been taught to guide, he should be fastened to a log of medium weight by means of two lengths of plough chain. If, on the signal being given, the animal failed to move, it should receive a smart cut from the whip. It should be stopped frequently and fondled, a little extra weight being added to the log. When the colt went quietly, it could be given a run between a couple of quiet horses. Work in the seed drill could then be given. The breaker should see that the animal was as quiet as possible before being put to work. Overworking and underfeeding were to be avoided. Mr. Smith advised breaking in a draught animal at from two years to two and a half years of age. A good plan of catching the beast was to run it into a stall together with another horse. After it had been handled, the winkers with a rein on either side, should be put on, and the colt run around, first one way then the other. After it had been made to draw a log, it could be put in the body of a wagon team, subsequently giving it a place in the shafts and then in the lead. Attempts to make the animal pull at the outset would probably result in it becoming a jib. In regard to light horses, he said, they should not be broken in until they were at least three years old. Mouthing was of the utmost importance, and after that was carefully effected, the beast should be put into a trap with a quiet horse. Mr. H. L. Will advised handling the foal when it was young. After it was mouthed, it should be harnessed between two steady horses with good couplings, but not too long, and cross reins. Subsequently it could be put in between chains and hitched to a plough.

### MILTALIE (Average annual rainfall, 14.55in.).

September 9th.—Present: nine members and two visitors.

**Working Back Fallow.**—Commencing with the declaration that working back fallow was a very important operation, Mr. H. J. T. Bagnell, in a paper on that subject, remarked that the harrows, which should be started as soon as the land became too hard for fallowing, should be of a good heavy type, and should be put across the ploughing. Stump picking should then receive attention, the land then being left until the middle of September or early October, at which time it should be worked back with an 11 or 12 furrow light skim plough. That one ploughing would be found quite sufficient, provided it was done when the ground was in good condition. Subsequently the spring tooth cultivator could be used; harrowing with a light implement across the ploughing should then follow. During the summer months the sheep should be allowed to run over the fallow occasionally and pick off all weeds which appeared, but they should not be allowed on the fallow while the ground was very wet, because it set too hard and the cultivation was greater. That land could be harrowed again after rain (not while wet, because of the tendency to set), but if done while the ground was damp it had a very beneficial effect at all times of the year. In fact, fallow could not be harrowed too often under those conditions. If more harrowing was done after summer rains, great benefit would be derived. Mr. T. J. P. McEachen did not see the necessity for so much harrowing. A set of harrows would soon be worn out if weighted. Dry harrowing was useless except to kill weeds. Mr. J. P. Story considered that the harrows were not used sufficiently on most farms. Mr. E. Story said that one ploughing was enough for fallow with plenty of harrowing and cultivating to kill the weeds. It paid to harrow wet or dry. Mr. L. Aunger would only plough once, and, if a farmer had no cultivator, he could use the twin plough with the mouldboards off and give it a good cross harrowing. He would not work land likely to drift so much as stiff soils. Mr. H. R. Jacobs said, that light working fallow was the right thing generally, but it largely depended on the land and how it had been first ploughed. Land that he had ploughed when very wet had set so hard that it would be necessary to plough it again when more rain fell, because harrows would do very little good in its present state.

## ROBERTS AND VERRAN.

September 12th.—Present: four members and one visitor.

Breaking in a Cow.—In breaking in a cow, observed Mr. W. Whittaker, in a paper on that subject, it was advisable to secure the animal with a rope, caught over the horns by means of a slipknot, and have an attendant to hold the animal by that means close to the horns. The udder should be rubbed before and after milking, the latter operation being commenced gently, the pace being gradually increased. Mr. A. F. Cowley said that it was necessary to treat a young cow very gently, and it needed very careful milking. If either the front or back teats were milked more strongly than the other, they would always carry the most milk and the udder would not be well balanced. Mr. H. F. Imhoff said that a cow should be kept in milk as long as possible after her first calving, because if allowed to dry off too soon she would always be inclined to dry off about the same period. It was well to take the calf away from the cow as soon as possible after the cow had cleaned it, because the cow would then be less likely to fret about it.

## YADNARIE (Average annual rainfall, 14.09in.).

August 12th.—Present: eight members and one visitor.

Poultry.—In a paper devoted to a discussion of the merits of keeping poultry on a farm, Mr. A. Jericho expressed the opinion that the barndoor fowl was the best adapted to the farm. It was well to exchange eggs for setting, in order to avoid in-breeding. Incubators required the expenditure of too much time and labor to be profitable on a farm. Hens should be sold or eaten after their third laying season, except 25 or 30, which should be kept for setting. They should be set whenever they became broody, in order to have pullets commencing to lay all the year round. A fowl shed fairly large should be provided, with a yard attached. The shed should be built of galvanized iron, broom bush, or stumps. The yard should be enclosed with 6ft. wire netting on the sides and on top to prevent the crows getting to the nests and to keep out the foxes. Great precautions should be taken against tick, which it was almost impossible to eradicate when once established. Mr. W. L. Brown considered poultry a profitable side line. Mr. A. Spriggs was of opinion that fowls did best on limestone country. Mr. F. W. Dreckow recommended crossing common fowls with pure breeds from time to time. That was the secret of egg production. Pure breeds were not so hardy as the cross. The Chairman said that poultry must be housed, if kept for profit. Mr. G. A. Dreckow found common weevil wash most effective in treating tick.

BUTLER, September 11th.—A short discussion on the question of fallowing took place, the prevailing opinion being in favor of early fallowing.

COORABIE, September 9th.—A paper on the bulk handling of wheat, more particularly as it affected that district, was read by Mr. H. V. Hobbs. He dealt exhaustively and impartially with the subject from every point of view. A protracted and animated discussion followed.

KOPPIO, September 12th.—Mr. W. R. Richardson delivered an address on his travels and observations in the Eastern States.

KOPPIO, October 10th.—A meeting was held by invitation at the homestead of Messrs. Richardson Bros. and an inspection was made of the sheep, crops, and horses, which were in excellent condition.

MOUNT HOPE, September 15th.—Mr. R. L. Myers read a paper, in which he discussed the rural outlook.

# EASTERN DISTRICT.

## (EAST OF MOUNT LOFTY RANGES.)

### LAMEROO (Average annual rainfall, 16.55in.).

August 12th.—Present: 14 members and three visitors.

Lucerne Growing.—For lucerne growing, remarked Mr. W. Neville, of the Wilkawatt Branch, in a paper on that subject, a good piece of sand land, either white or red, of a fair depth, say, from 6in. for 1ft., should be selected. It should have a gentle slope to ensure good drainage. The reason for selecting sand was that magnesia, &c., which existed in the water, drained away through it, but where heavy land was irrigated it would soon be clogged with magnesia, and the lucerne would gradually die out. In July the land should be ploughed as deeply as convenient with a good quantity of stable manure, and worked until the end of September. Then 1cwt. or 2cwts. of super. or bonedust per acre should be drilled in, and on a fine seed bed 10lbs. to 12lbs. of seed per acre should be broadcasted. It was advisable to divide the seed into two lots, mixed with sand, in order to give a greater bulk, and apply in two operations, one lot each way, in order to secure a more even sowing. The seed should be covered either with light draught harrows or a bough, which would answer the purpose equally well. Then it should be watered and the watering should be repeated every few days if the surface were becoming too dry. When the lucerne had attained a height of 6in. it should be cut and allowed to lie where cut to protect young growth and surface roots from heat. After cutting it should be well soaked, and then a good stand would be secured. Exceptional cuts must not be expected the first season, but succeeding years would fully repay the first year's efforts in establishing the plot. Every time a cut was taken it was wise to give a top dressing of stable, or, better still, fowl manure. The proper time to cut lucerne was when the young shoots appeared to be ¼in. to ½in. in length. If cut before that the plant would be weakened. When the plot had been established a couple of years it would be beneficial to root it up somewhat in the spring time with weighted harrows, tine cultivator, or disc harrows, and work in bonedust or lime. Mr. A. J. A. Koch said that the slope in the plot should be very small. From 30 to 40 tons of stable manure per acre was not too much. Hunter River seed was the best, because it grew well in winter. Mr. S. R. Sinclair said that it took one mill all its time to keep a small patch of lucerne going. Mr. E. T. Wray said it took more water than could be had to keep a small lucerne patch going. Where 200 or 300 sheep were kept, besides other stock, one bore was not sufficient.

Use and Abuse of Machinery.—Mr. W. J. Taylor, of the Wilkawatt Branch, read a paper on the use and abuse of machinery. He said that, with the increasing prices for machinery, it was necessary to consider whether the best use was being got out of the machines. Manufacturers could assist in prolonging the life of their machines by making improvements to suit the conditions of the country. A farmer should take as much pride in his machinery as he did in his stock, and that would go a long way towards getting the best use out of it. In purchasing machines regard should always be had to future plans, developments, and requirements, and then it would not be so continually found that machines were growing useless. Engines especially should be purchased several horsepower beyond the extent to which it was intended to use them. Proper lubrication was another essential, and for that purpose different classes of oil should be used, thin oil being applied to a fast travelling bearing and thick oil for a slow motion. There should be sufficient lubricator cups to ensure a good flow of oil to the revolving parts. He strongly recommended the patent force-feed lubricators. All machinery should be placed in thorough repair long before it was required for use. Every farmer should do his own repairing, and for that purpose there should be a blacksmith's shop on every farm. Mr. F. W. Eime urged the necessity for providing sheds for farming machinery. Stumps and sand shortened the life of harvesters in that district. Mr. A. J. A. Koch recommended the use of the common oil feeder, because it was a great oil saver. Heavy oils should be used in summer and thin oils in winter.

### MONARTO SOUTH (Average annual rainfall, 14in. to 15in.).

October 7th.—Present: 20 members and three visitors.

Sinking a Dam.—Mr. H. Frahm outlined his method of sinking a dam. Having selected a good catchment, it was necessary, he said, to ascertain whether the subsoil would hold water. That could be accomplished by sinking a small hole to the required depth and filling it with water. For sinking, he preferred a single furrow plough and a four horse automatic scoop. A long narrow dam was better than a square one. In commencing work, all surface ground should be removed well back, so that the embankment might be formed of the subsoil, good water holding clay, and it should be well bound with the sides of the dam. If the surface ground were not removed from the embankment it would be useless. The dam should be fenced to keep out great cattle, but sheep might be allowed in, because they improved the embankment by packing it. In the discussion which took place, Mr. Frahm's scheme was endorsed.

ENGINES ON THE FARM.—In a paper dealing with engines on a farm, Mr. R. Hein said that he favored the oil engine, where a large amount of work was required in the cutting of chaff, crushing, &c., and the engine had to be worked continuously. That did not become nearly so hot as the petrol engines, which were far more complicated and required much more attention. However, in that district, a 6-h.p. petrol engine and a No. 3 chaffcutter would be best. The engine should be in a space separated from the chaffcutter, because of the dust arising. Discussion followed, in which preference was expressed for the petrol engine because it could be so quickly started.

## MURRAY BRIDGE.

September 11th.—Present: 23 members.

VEGETABLE GROWING ON SWAMP LANDS.—In a paper dealing with vegetable growing on the reclaimed swamp lands of the Murray, Messrs. J. Fletcher and A. R. Hilton wrote:—The reclaimed lands on the Murray offer opportunities for vegetable growing unequalled in South Australia. Abundant water is available, and the land is of the richest character, yet the vegetables needed for the district come largely from Adelaide, and in many cases owners of suitable land do not even grow sufficient for their own use. In the Murray Valley much more time and importance should be attached to the vegetable garden. To those whose work is of a trying nature, or such as to keep them indoors, there is no equal to it as a recreation. Before going into the actual growing of vegetables the question of the soil for the garden must be touched on lightly. It is useless to expect good results unless the soil is in good heart. If there be a good loam with a clay subsoil, so much the better, but a poor soil can be got into good order and made fertile. In the case of swamp lands—and it is to those this paper particularly refers—in choosing a garden it should be on the higher part usually found near the river, and not so liable to flooding as the lower areas. The land should be either trenched or the ordinary plough used, followed by a subsoil plough, care being taken that the subsoil is not brought to the surface. Rolling and harrowing should then be practised to bring the soil to a fine state. Many vegetables, especially the root crops, respond wonderfully to a deeply-worked soil. In fact, without this deep working, they are usually forked and of poor size. When the land has been well worked, great care should be taken to kill the weeds. Weeds cause the loss of an enormous amount of all crops, in fact, one writer says that 50 per cent. of the possible yield is not secured owing to the loss caused by weeds. Not only do weeds take up the space required by the crops, but they rob them of water, food, light, and air, and hinder cultivation. Many weeds are in alliance with the insect and fungus pests, e.g., charlock, acts as host to the turnip fly, and the fungus disease causing club foot in cabbage. When the land is cleared of weeds the various pests are far less troublesome. When vegetable gardening has been practised on the swamp lands the weeds have proved a big problem, because, after flooding, the weeds seem to grow by magic. The land, therefore, should be irrigated some weeks before planting to give sufficient time to start the weeds into growth. By then turning them in, a clean seed bed may be assured for the coming crops. Great care should be exercised in the choice of seed. Nearly all seed rapidly deteriorates with age, and a simple experiment should be made where valuable crops are to be planted, to ensure that a high percentage of the seed will germinate. If 100 sample seeds are placed on a damp flannel and kept in a warm place, it can be readily seen what percentage will germinate. The land being ready, consideration must be given to the question of what are the crops most suitable. The subject may be considered under the heads of green crops, root crops, and pod bearers. Of green crops there are the following:—The cabbage family, including cauliflower, kale, and broccoli; celery, lettuce, all kinds of marrows, rhubarb, and strawberry, silver beet, and tomatoes. Root crops include potatoes, carrots, parsnips, turnips, swedes, onions, red beet, artichoke, and sweet potato. Legumes include peas and beans, embracing French and broad beans. Some of these crops seem particularly suited to local conditions, while others are not altogether successful, or, at least, not in the seasons so far as present observations go. The cabbage family, for instance, though it grows strongly, is subject to attack by cabbage aphis and cabbage moth, which, in a few days, render a fine bed an unsightly mass. But these seem worse in dry seasons, and a more suitable system of watering might make a difference. Hence heavy planting of cabbages or the cabbage family is not advocated. Lettuce does particularly well, so also does silver beet and rhubarb, which should pay well to cultivate extensively. If a good variety of rhubarb, such as Tapp's Winter and Victoria Giant were grown it should produce splendid crops. The plants should be planted a yard apart in land liberally treated with stable manure, as they are gross feeders. The stems should be pulled off, but sufficient left to keep the plant healthy, and they should never be allowed to seed. The roots may be obtained or seed easily raised in spring and planted out the next winter. Rhubarb is very little troubled by disease or pests. Celery will do well in rich swamp soil, but should never be allowed to become dry, or the plant becomes stringy. It is easily raised from seed in spring, and should be planted four feet apart in trenches 18in. deep and a foot wide. As the plants grow, fill in the trenches, taking care to prevent the soil getting into the heart of the plant. Celery responds readily to liquid manure, is little troubled by pests, and the salad white is a good variety to plant. A strawberry bed should be on every holding as strawberries make wonderful growth, and may be found in bearing from October to March. Mr. Quinn, in January last, remarked on the splendid plants he saw in the swamps. There should be a great future for strawberries in the Murray Bridge district. The greatest drawback is the question of labor, as they must be kept clean, and the runners prevented from rooting. If the plants are set out in the early autumn, while the soil is still warm, they get a good hold before the winter sets in. The soil round strawberries should never be deeply dug, but should be hoed lightly. Strawberries are at their best in their second year, and should be dug under after the third year, and each year a new bed should be planted out. The tomato is a plant particularly suited for the Murray swamp lands, and very fine crops may be assured. On acount of the possibility of a late frost it is not suited for early crops, but gives good results for main and late crops. Seeing that satisfactory prices are given for tomatoes, even for sauce making, they should be more cultivated locally than they are at present. Tomatoes should be raised in a hot bed or sheltered place, and hardened off before being planted out. For early crops, sow seed in July, for late crops, in October. When planting out, choose a cool day, and plant in rows six feet apart, with five feet between each plant. Plant in the afternoon, and give each plant a pint of water. Afterwards do not flood, but run the water down in channels between the rows. No manure is required on the swamps, and too liberal manure anywhere should be avoided, or the plants will run to rank foliage, and crop very late. Four weeks after planting run a cultivator between the rows, and hoe round the plants, to keep the ground loose and moist. When the vines begin fruiting, hill the plants with a small plough; this will prevent the winds blowing the plants about, helps to raise the fruit from the ground, and prevents the water lying around the stems. For early planting where frosts may be expected, cut kerosine tins cornerwise into two pieces, turn the open side towards the north-east, and, if available, shelter with a piece of glass. It is also important that breakwinds should be placed where winds are strong. Where practicable, and especially in small gardens, the bushes should be trained to stakes, and by a system of pruning better and earlier fruit may be obtained. As the young plant grows, the leader is tied to a stake, and all side shoots are pinched out of the axils of the leaves, but often the first three shoots formed are allowed to remain. In connection with the pruning, it will be noted that the flowering stems arise from the stem on the opposite side to a leaf. Like the grape vines, the fruit-bearing growth of the tomato is devoid of leaf growth. In training to a single stem, all side shoots are pinched out, and the main stem encouraged to ascend until three or four good fruit clusters are formed. The terminal bud is then pinched out of the leader, and the sap thrown down into the fruit clusters. Over watering is to be avoided, and the best guide is to be found in the growth of the plant. If this be continuous, but not rank, they are doing very well. Very vigorous growth is not suitable for setting fruit. • After a good setting of fruit, watering may again be resorted to. Some good varieties for the district are the Market Favorite, which is probably the most abundant bearer, and is an early tomato. For late crops the Mikado and Pondisona give large fruit of excellent flavor. In the Hawkesbury district of New South Wales £60 per acre is regularly made by tomato growing. Melons, including trombones, marrows, watermelons, and pumpkins, are very suitable for the district, as they thrive in the hot sun, rich soil, and moist conditions of the swamp areas. The great thing is to so work the land that the weeds may be killed before planting. Plant in rows, 30ft. apart, about October. In small gardens, where space is limited, some of the varieties of bush marrow, which mature very early and bear good crops might be tried. On high lands an old hot bed is an ideal spot for trombones. There, too, the cucumber family may be included. Trombone family make a splendid vegetable food, and may be stored to keep all the winter. A fine variety for winter use is thè Hubbard Squash. Nearly all the root crops do well on the reclaimed lands, *e.g.*, red beet, parsnips, carrot, turnip, and swede, and are not much subject to disease and pests. It may be noted that they need a deep soil, and a fine surface tilth; where the land becomes hard or cracked they will not be a success. Planting in rows and thinning out are recommended; the weeds then can be kept under. Two plants worth trying are the artichoke and sweet potato, especially the latter, which grows to an enormous size, and makes a very pleasant change from the ordinary potato. As a root crop, the onion deserves special mention. It can be recommended as being free from many pests, and in this district a crop of 30 tons to the acre has been grown. As with other crops, the land cannot be too well worked. It would be necessary here to raise seedlings and plant out, as by planting seed the weeds would grow much faster and choke them. The seed for an early crop should be sown in April, and for a late crop in June. Plant out in cool, moist weather, avoiding winds. The quantity of seed to be used per acre is about 2½lbs. Onions, unlike other crops, may be grown on the same lands for years without manuring, and a series of experiments gave the highest yield to those plots where the land had been left in its normal state. Onions should be planted in rows 10in. apart, the plants to be a distance of 5in. from each other. This allows room for a double hoe to work, which will be found a valuable implement for this crop. While the onions are growing the land must be kept free from weeds, as the foliage of the plant is of such a nature that it cannot choke the weeds as the potato does, and probably the greatest objection to growing this crop in large quantities will be the difficulty in keeping the crop clean. Much depends on cleaning the land before sowing. Suitable kinds for growing in early crops are Early Globe and White Spanish, and for main crops and best keeping onion the Brown Globe is difficult to beat. Potato growing on swamp lands presents certain difficulties, which must be experienced to be appreciated. The chief difficulty here will be to properly regulate the water supply, as to flood a potato crop at certain stages means to court disaster; in fact, to grow good eating and keeping potatoes, a well-drained soil is a necessity. One of the most important things in potato growing is to change the seed every two or three years, and to change the position in which they are planted. Procure fresh seed from a cooler district than that in which they are to be grown. Good sound seed should be procured some time before they are required for planting, and they should be spread out under the shade of trees and turned over from time to time, as in that way strong, healthy shoots are developed. For early potatoes a northerly aspect is the best, as they will stand a fair amount of frost, so long as it has time to thaw before the sun gets on to the tubers. Early planting would be too risky on the swamps, though many of the slopes above the river would probably grow splendid potatoes if they were irrigated. An authority considers that those sandy slopes are ideal places for potato growing. Where the seed is not more than two inches in diameter it should be planted whole, and in cutting care should be taken to see that there are two good eyes in each set. Kinds that have been successful on the swamps are Redskins, Manistee, and Snowflakes for late planting. Under suitable conditions, good results should be obtained. At Monteith 10 tons were removed from half an acre. When planting, the land should be watered a week beforehand if dry. The rows should be three feet apart, thus giving ample room for banking, and hindering the ravages of the wire worm. Much judgment is required in watering potatoes. On peaty and well-drained soil it is a simple matter, but, on the harder black soil around Murray Bridge it would be advisable to have furrows 30ft. apart, and when watering these should not be allowed to overflow, or water to appear on the surface. After watering care should be taken that the land drains readily. On the other hand, the soil should be kept moist, or after watering the potatoes will start to grow again, and instead of a good sample the tubers will be knotty. Irrigation should not be resorted to after the blossoms appear on the plant. In planting, a convenient method is to use a double-furrowed plough, which will give a distance of three feet between the rows, and plant four or five inches deep, harrow lightly when the potatoes appear, and bank up with a potato digger when six or eight inches high. The time to sow Redskins or Manistee is October, then dig in December, and plant Snowflakes. In some cases potatoes have not been satisfactory on the swamps, and it has been suggested that a good dressing with lime, about one ton to the acre, would have a beneficial result, both in regard to reducing the acidity of the soil, rendering the top soil more friable, and in driving away wire worms. Where these are bad, dig the crop early, or the tubers will be attacked. Pod bearers, or legumes, give good results on the reclaimed lands. Broad beans and Yorkshire Hero peas grow very heavy crops. They are extremely easy to grow, and, given a good start, will outgrow and choke the weeds. As they grow very strongly, set in rows three feet apart, and they will then overlap. Once they are well started, the moisture in the soil is sufficient without irrigation. For early crop, the Early Sunrise is to be recommended, though it is not equal in flavor to the Yorkshire Hero. Whatever crops are grown, it will pay to consider the matter of their rotation. Do not grow green crops, for example, in the same plot year after year. Arrange a succession of green crops, root crops, and pod bearers, and remember that the latter improve the soil by adding nitrogen to it. Rotation also helps to overcome the pest trouble. Thorough cultivation is essential, and very much less watering need be done by keeping the top soil in a state of fine tilth. Killing the weeds will go far to assist the crops and keep down pests which live among and on the weeds. At present the swamp lands need little manure, but as heavy crops are removed it will probably require feeding. The present system of watering the land by flooding is not a good one for vegetable growing, and if any one could arrange a system of sprinklers, very fine results would be obtained. The swamp lands would probably be greatly benefited by a good dressing of lime.

### RENMARK (Average annual rainfall, 10.93in.).

August 10th.—Present: 15 members and two visitors.

General Management of a Ten-acre Block.—Dividing the subject into four parts, namely, cultivation, harvesting, pruning, and general, Mr. T. Hooper, in a paper on the general management of a 10-acre block, proceeded under the first head to say that cultivation was the most important consideration. The land should be ploughed to a depth of 5in. in late winter, and the lands thrown out from the centre before ploughing back. The harrow should follow the plough as soon as possible to break up lumps and give a general levelling down before the first irrigation. After irrigating the land should be well worked with the disc, or, for preference, ploughed back to the vines. That killed the weeds, which were generally most troublesome in the early spring. He strongly advocated a second ploughing, which tended to keep the soil fairly level. After succeeding irrigations the disc cultivator and harrows would keep the land in good condition. Hoeing should follow horse cultivation. By hoeing he meant thorough hoeing, breaking up all the land which the implements had missed, whether there were weeds or not. That was specially required with young stuff of all kinds after every irrigation. If that were more thoroughly attended to there would not be the necessity for so much replanting year after year. In regard to harvesting, the keynote was method. Too much money was spent in labor at that time of the year. Last season he harvested 7 tons of fruit which cost him in wages a trifle over £12. With the assistance of one man he did all the work. He had no rack, and all his drying was done on 3ft. by 2ft. wooden trays. Slightly over 4 tons of sultanas were all three crown, and most of his lexias five crown. In pruning different blocks required different treatment, according to the strength of the vines and the quality of the land. Every vine should be treated on its merits. He wished to say that the theory that the rod on sultanas from old wood did not bear fruit was wrong, because his experience had been that it did bear fruit. He preferred pruning in July. Lastly, there were a few things he wished to point out, and the first was that a 10-acre block required the same number of implements as a larger property, and in most cases two horses were necessary. The small man, therefore, labored under many difficulties. He was a great believer in gypsum, which spelled success to the man on the heavier soil. "Thoroughness" should be the watchword of the blocker, and he should always finish one job before commening another.

## ROSY PINE.

September 13th.—Present: 14 members.

Keeping Farm Accounts.—For the "double entry" system of bookkeeping, observed Mr. F. G. Bonnin, in a paper on keeping farm accounts, two books were required, a journal or day book, and a ledger. A separate cash book might be kept if desired, but was not essential. The day book contained a record of all moneys received and spent, and it indicated to which accounts they should be subsequently entered in the ledger. The day book required to be kept up to date at all times, otherwise mistakes and omissions would occur and render the work practically useless. The ledger could be posted up at any time. All cheques drawn should be entered in the day book. The ledger contained a person's own private account, and also an account for each of the persons or firms with whom he did business or had dealings. In the ledger, for every credit shown on one side, there required to be a corresponding debit in some other account. If that system were carefully followed, the books would be correct, and the accounts would balance. The farmer's private accounts, which would be all debtor accounts, should show all disbursements of money on the farm, grouped under different headings, which should be divided up and named to suit individual requirements. The "house account," for instance, which included all living expenses, should, at a glance, show how much had been spent on the housekeeping. All the storekeepers' accounts for food, &c., would be grouped in that account. There should also be a "wages account," which would record all payments made for wages, and the names of the persons to whom the payments were made. There should also be accounts for "plant," "stock," "seeding," "harvest," "freight," "fodder," &c., each showing the various items of expenditure under their own particular heading The number of those accounts could be increased to suit different needs, but the greater the number of accounts the heavier the work, and it was therefore an advantage to make the number of accounts as few as possible, consistent with the usefulness of the work. Besides the two books, day book and ledger, a diary might be kept in which should be entered what the various men employed on the farm were doing each day, in order that the exact cost of any particular work might be obtained if required. At seeding time the number of acres drilled each day should be recorded, also the quantity and variety of seed sown, and the quantity of super. per acre. At harvest time, a careful record should be made of all the bags of grain, the number of bags in each wagon load, the weight and to whom delivered, and note should also be made of the yield of each particular crop and paddock. The date on which each man commenced and finished working and his rate of pay should be recorded. The history of each paddock cropped should also be put down in a note book for that purpose. Lists should also be kept of all stock on the farm, the dates on which there were increases or decreases, also the dates when the female stock were mated and the date when the young were dropped.

## ROSY PINE.

October 11th.—Present: 10 members and one visitor.

Care of Harness and Implements.—Too much care could not be taken of harness and machinery on a farm, declared Mr. M. A. McCabe in a paper dealing with that subject. Harness should not be allowed to lie on the ground, but be kept in a specially built shed. At least three times a year it should be oiled, and the farmer was advised to keep on hand needles, hemp, wax, and bifurcated rivets to effect repairs. Due protection from the weather should be afforded all machinery, and attention should be given to all bolts and oil to bearings, particular notice being given to the cleaning of oil holes. Messrs. W. Schiller, W. Pannell, and A. Sands discussed the paper.

### SHERLOCK (Average annual rainfall, 14in. to 15in.).

September 23rd.—Present: seven members and one visitor.

Mixed Farming.—In a paper treating of the advantages of mixed farming, Mr. J. P. Trezona advocated the division of the farm into three parts, which should be used in rotation for oats, fallow, and wheat. The wheat crop was much more prolific after oats, and there was less liability to the ravages of takeall. Sheep on the farm provided a large revenue, but, in the absence of suitable fences, sheep were better left alone, in which case attention should be paid to dairying, pigs, and poultry. He believed in keeping pure breeds of cows, and preferred the Jersey. During the drought they maintained their condition, and their milk was better than the crossbreeds. He chose the Jersey for cream, because, in that district, there was no market for milk. With pigs it was necessary to choose a suitable breed, and he recommended a Berkshire boar mated with a Middle York sow, because the progeny fattened more quickly on less feed and attained heavier weights than other breeds. For poultry, screenings provided feed at practically no cost. For egg production, White Leghorns were best, but the White Leghorn hen mated with a Wyandotte rooster produced an ideal farm bird. The best table birds were the product of a Malay rooster and a Black Orpington hen. They were very hardy and the hens made splendid mothers. Turkeys, geese, and ducks should also be kept. A foal or two should be raised each year to replace losses by death.

### WYNARKA.

August 12th.—Present: 10 members and two visitors.

Sheep Carrying Capacity of a Farm.—Under this title Mr. T. Yeates read a paper, in which he reviewed the improvement which the use of fertilisers had worked in the sheep-carrying capacity of farms. After discussing the evils of overstocking and understocking, he emphasised the necessity for those who sought to raise fat lambs growing catch crops, in order to provide green feed for the ewes at lambing time. Some of the best crops to grow were barley, mustard, oats, and early wheat. Though in a dry season such crops might fail, it was also to be remembered that in such a season the natural herbage would also be wanting. Other means would then have to be adopted. Chaffed straw and molasses, which involved little labor, provided a fair substitute, but was hardly sufficient to raise early lambs, and something better would have to be provided. He recommended 1lb. per day each of crushed barley and crushed oats, or half a pound of each and 1lb. of bran, which would keep the ewes in good condition, and cost only one penny per day, or say 2s. per ewe for the three or four weeks for which it would be required. That outlay was justifiable with fat lambs realising 20s. to 30s. each. Until farmers had more experience in growing catch fodder crops they should go slow in regard to increasing their flocks, and therefore the selection of the right number of sheep to carry—the happy medium between too many and too few—would have to be left to each farmer to work out for himself. Mr. Schultz said that the best use could not be made of the land until sheep were kept on the farm. Mr. Packham said that sheep were better than harrows for consolidating land when in moist condition. Mr. Boyce advocated growing one or two hundred acres of oats for feed, but considered that the district was better adapted to raising fat lambs than wool.

BORRIKA, August 12th.—Mr. R. L. Penfold read a paper on co-operative purchasing and selling, in which he referred to the profits made by the middleman, especially in relation to the sale of super. and the handling of the wheat harvest.

CLANFIELD, September.—In a paper treating of economy of time on the farm, Mr. E. Daws pointed out that a large amount of time would be saved on a farm if the homestead were properly planned in the first instance. The stable and hay and chaff sheds should be under the same roof, with the stack close enough to permit of the hay being pitched almost directly into the shed instead of being situated 200 or 300 yards away, necessitating the use of a dray or lorry. The erection of gates, instead of the provision of three or four loose wires, would save more time in the first half-dozen occasions on which the gate was used than was taken in erecting them. At a previous meeting, after setting out the advantages to be derived from fallowing, Mr. J. Cockshell, in a paper on that subject, remarked that fallowing should succeed seeding as quickly as possible by ploughing the heavy soils when not too wet nor too dry, and continuing on the lighter soils when it was not wise to plough the heavier ones. He preferred disc ploughs, because they turned the ground well, cut a large percentage of shoots, and would go through more straw and rubbish than a share implement, and there was no risk of the implement being hooked under firm stumps, which always jarred the shoulders of the horses. A 10-disc plough, drawn by nine medium draught horses, formed a good fallowing turnout, and it was possible, by feeding the team well, to average 60 acres per week on land which had not too many big shoots. A fortnight after ploughing the ground should be harrowed. In the spring time it should be cultivated to keep the weeds from seeding. There was the trouble of fallow on the sandridges drifting, but if half a chain along the tops of the ridges were left to grow mallee a large proportion of the drift would be prevented. The consensus of opinion in the discussion of the paper was that farmers must fallow more extensively, and that the best implement for the operation was the disc plough. Mr. Wilkins recommended cutting shoots immediately after fallowing.

KINGSTON-ON-MURRAY, September 25th.—Mr. Bransome, a visitor from Two Bays Nurseries, Victoria, delivered a lecture on pruning and fruitgrowing, dealing mostly with the sultana. He described the methods adopted in Mildura, and stated that from 2 to 2½ tons of dried fruit per acre were gathered from that district. He dealt briefly with the peach, nectarine, pear, and orange, and said that the object should be to build up the tree and furnishings. The three great factors in productiveness were manuring, cultivation, and pruning.

MINDARIE, October 2nd.—Mr. F. W. Witt read a paper on homestead planning, in which he advocated the selection of a suitable site of about 10 acres. The house should be placed on the west side, the stable on the eastern side opening to the east, and the implement shed on the southern side, opening to the south to avoid the sun shining on the implements. On the north side he would erect the barn and other small buildings. The blacksmith's shop, which was almost a necessity, should be adjacent to the implement shed. The buildings should be of stone, roofed with iron, as a protection against fire and because it enhanced the value of the farm. The bore should be on rising ground, as near the house as possible. There should be a small garden near the house, and sugar gums should be planted to set off the appearance of the place. Mr. J. W. G. Mann considered that iron roofs were too expensive at present rates. Mr. E. L. Parker preferred that the stable should open towards the east and that the bore should not be too close to the stable. Mr. F. Johnson liked to be able to see his horses feeding from the back door of his house. The buildings should not be too close together, because of the danger of fire, but they should all face the one way. He preferred iron roofs to straw and they looked neater.

NETHERTON, August 12th.—Mr. C. M. Wilkin read a paper on fallowing, and recommended first of all close attention to the fitness of the plough. He preferred a heavy fallowing to a light skim plough, because the work was rough and heavy. The depth should be 3in. or 4in., and there should be a fair amount of draught to pull out all the stumps possible, and break as many roots as possible. Fallowing should be done in June, July, and August, when the ground was wet, and then left in that state for three months. In April it should be broken up with the tine cultivator, then drilled and harrowed, the operations being finished by the end of May if possible.

STIRLING'S WELL, August 5th.—Mr. R. C. Daw read a paper, "Sheep on the Farm," in which he recommended the Leicester or Shropshire cross, but declared that on no account should Vermonts or wrinkled sheep be kept in cold, damp places, because they were not good doers, and were very difficult to shear. The Crossbred would fatten where the Merino would only just exist. Crossbreds were marketable much sooner than Merinos, and generally realised higher prices.

September 9th.—Mr. P. Ridge read a paper dealing with the preservation of the natural growth of the farm, in which he advocated leaving some of the timber on the holding for shelter for stock. The mallee country, when denuded of its timber, was liable to suffer severely from drift, which would be counteracted if belts of timber were allowed to remain, a plan which would also improve the appearance of the country. Plenty of timber should be allowed to stand around the homestead as a breakwind and a check against sandstorms in the summer time.

WAIKERIE, September 15th.—Mr. H. Lehmann read a paper on cincturing vines. He said that he had tried many methods, but strongly advocated the double cut, removing a narrow strip of bark and causing a wound, which healed rapidly and did not gum. He found that cincturing sultanas had increased the yield considerably, and as far as he could see, had not injured the vines.

## SOUTH AND HILLS DISTRICT.

### BLACKWOOD (Average annual rainfall, 27in. to 29in.).

September 18th.—Present: 15 members and one visitor.

PIGS IN THE ORCHARD.—Mr. L. Sullivan, in a paper dealing with this subject, said he preferred to turn the pigs loose in the orchard, although it was necessary to enclose the area with netting. In that way labor was saved and the pigs gathered fallen apples and other fruit themselves. By that means the fruits which had codlin moth were consumed by the pig and the grub was destroyed. Troughs should be placed at convenient spots in the orchard, where a mixture of pollard and water might be provided as a drink. When all the fallen fruit had been cleared up, the pigs could be shut up and fed well for two or three weeks before being marketed.

IRRIGATION.—Mr. D. R. Williams read a paper on irrigation, in the course of which he said that if a profuse growth was desired the watering should be continuous. Subterranean water always contained a quantity, more or less, of mineral salts which were injurious to plant life. In using river water he had frequently noticed that towards the end of summer there was more soda in the water than earlier in the season. Irrigation by sprinklers was hardly practicable, because in an orchard, of say 20 acres, the cost of fittings would be very great. The most practical method was to run plough furrows along the least line of fall, in order to guard against the washing away of the earth. The furrows should always be cultivated in again after the watering, because, if left open, the sun would soon dry out the moisture which had been put in and leave the place as hard as ever. A big head of water was required for flooding, and when water was no object this was cheapest, but where water had to be pumped and it was necessary to prevent waste, a sprinkler was better. It did not do, however, to sprinkle all crops, tomatoes especially, as they were liable to crack. Lettuces in summer rotted if sprinkled.

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### CYGNET RIVER.

October 5th.—Present: eight members.

POULTRY.—The keeping of poultry on Kangaroo Island, either on a large scale or as a sideline, should prove profitable, observed Mr. A. C. Osterstock, in a paper on poultry. Should a large number be kept, incubation should be adopted, which would dispense with the keeping of heavy birds, light breeds being the best layers. Brooders should be made portable, with protection from winds, and should be provided with warmth, either sunshine or artificial. Chickens under three weeks should be fed mostly on crushed grain, because soft food often caused many ailments. A few sunflower seeds, well cooked meat, and green stuff were a valuable change. Poultry houses should be built on well drained land, free from stagnant pools. They should be supplied with scratching litter and all roosts should be built on one level. From eight to ten hens should be kept with each rooster for breeding purposes. If fewer hens were kept to one rooster they would fall off in laying, and if more, the eggs would not be fertilised, and either would not hatch or the chickens would be weak. Weak and sickly chickens would never make strong layers. Poultry should be housed comfortably, given plenty of exercise and changes of food to achieve the best results. Feeding twice a day was sufficient when grass was available. Grain scattered in scratching litter in the morning would promote exercise. Mash should be fed in the evening, because it was more easily digested. Mr. A. J. Wetherspoon favored the heavier breeds, because they laid a fair quantity of eggs and were good table birds. Mr. C. S. Miller preferred the original Langshan as the farmers' fowl, because 3ft. wire netting would keep them in. They laid a fair number of eggs and made good table birds. Mr. H. T. Noske stated that hens set on the ground produced better and stronger chickens than if set in boxes. A cross between the Silver Wyandotte and the Leghorn produced good layers and really good mothers. If hens were set off the ground the eggs required damping to get the best results.

## MILANG.

Sptember 9th.—Present: 48 members and four visitors.

Fodder Crops.—Cape barley, said Mr. H. Overall, in a paper on fodder crops, would, with fair conditions, grow more quickly than any other grain, and it would pay well if the land were heavy enough to fallow. He recommended drilling both ways, with ¾bush. per acre each way. He had sown and fed off with cows a seven-acre paddock for 10 years, and the paddock was very little the worse for its 10 years' cropping. The barley crop provided something for the winter months and, except in very dry years, there would be enough natural grass for the stock in spring. In regard to lucerne, where the watering had to be done by means of windmills, sandy land was best because it would grow with less water, was less liable to attacks of lucerne flea, and grew much later into the winter than on heavy soil. With a mill on a 6in. pump, lifting water about 12ft., and watering two acres, he managed, by keeping the mill going continuously for six months out of the 12, to obtain four or five cuts from it, and then feed it off for about three months. He recommended stirring up the land well with a sharp-tined cultivator and drilling in a good dressing of super. before the wet season was over, to give the lucerne a start for the summer. With proper attention lucerne would give a splendid supply of summer feed. Another useful crop to grow was mangolds (long red). That came on when the lucerne was nearly finished. On a small patch too salt for lucerne, he had grown eight successive crops, and was still obtaining good results, the best returns being from that portion which received the overflow from the lucerne watering. It would be advisable, however, to have two pieces of land and plant them alternately, because there were often mangolds growing when the land should be prepared for the next crop. The land should be worked down fine on top, in order that the hand drill could be worked easily. Mangolds would stand any quantity of manure. A large amount of feed for cows could be obtained by picking off the outside leaves when well grown. Mr. W. Saltmarsh said that mangolds were good feed for all stock. Mr. Moran said that rape, if fed to cows, would taint the produce. Mr. W. E. Richards always turned the cows on to the rape after milking, and it had no ill effects.

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## URAIDLA AND SUMMERTOWN (Average annual rainfall, 44.35in.).

September 4th.—Present: 15 members and two visitors.

Laying Down Land for Grass.—There were in the hills districts thousands of acres, remarked Mr. W. Kenell, in a paper on laying down land to grass, which could, with their splendid rainfall, be converted into good pasturage. The advantages were great and the cost small, and subsequently, when the land was broken up, it was in the finest condition to grow corn or root crops. The land should be properly drained and clean. In new land, a crop of field peas or bare fallow should precede preparation for the grass crop. After midsummer, the plough and harrow should be used thoroughly and the ground worked to a fine tilth, and when seed time came, the surface should be made into a very fine seedbed, firm and level. It was almost imposible to overdo work with the harrow and roller. Sowing should take place at the end of summer or in early autumn, because if a spring sowing were followed by a hot dry summer, young plants would suffer. The seed should be sown alone or with corn, but in the latter case, the sowing of corn should be thin. A quiet day was desirable for sowing, and the seed should be bushed in or the lightest of harrows used and then rolled twice. The success of pasture depended upon skilful management. When a few inches in height, the young plants should be topped off with a keen scythe and then rolled; any bare spots should be resown. A liberal top manuring would be most advantageous. Large weeds which might crop up, should be cut out, and where the cattle left clumps of grass, they should be cut with the scythe and the young growth would be eaten down. There should be no stint of seed in sowing, and great care should be taken to procure good seed, which might cost more, but would prove the cheapest in the end. Of the perennial rye grasses, he liked the Italian, because of its rapid growth in the spring, and the succulent herbage which it produced in a few months and the eagerness the cattle manifested for it, but a great objection to it was that its rapid growth tended to smother the finer varieties. The most desirable was the perennial English rye grass, because it was most reliable in its growth and fostered other varieties which were slow in maturing. Varieties most suitable in that locality were—Rough cocksfoot, Italian rye grass, English perennial rye grass, lucerne, cow grass, giant white clover, and prairie grass. About 40lbs. per acre of those varieties should be sown mixed. Mr. Johnson said that land in that district was too valuable to grow grass, but a small patch might be useful. Couch grass was a good hard fodder. Mr. Hunt said that there was plenty of land in the district on which grain could be profitably grown.

CHERRY GARDENS, October 10th.—Mr. K. Jacobs read a paper entitled "Home Methods of Drying Apples and Pears," in which he recommended careful picking of the fruit to be dried, because bruises in the dried fruit showed as black spots. They should be peeled, cut in four or six pieces and the core removed with a sharp knife. The pieces should be placed on wire netting or threaded on string and placed in the sun to dry. They should be taken in at night or covered over, because the wet spoiled them. The pieces should be kept from touching anything solid or touching each other. Three or four days sufficed for drying. When dry they should be packed away in a tin or case and kept in a dry place. In answer to questions, Mr. Jacobs said the varieties he used were—Apples, White Australia and Dunn's Seedling; and pears, Duchess and Vicar of Wakefield.

IRONBANK, October 7th.—Mr. C. Morgan delivered an address on tomato culture and urged the necessity for procuring good seed, which should be sown in small beds or boxes, in which a layer of manure should be placed first and then a layer of soil, in which the seeds should be planted. When the plants were up, and the rough leaves formed, they should be pricked out into beds, prepared in the same way as for seed. For early tomatoes the seed should be sown in July. The seed beds required to be damp. When the plants were 4in. to 6in. high they should be planted out into rows 4ft. each way, but 3ft. would be sufficient if staked. Mr. William Coats had pruned and staked his plants during three years, and found the practice very profitable, but he was not prepared to say that any sort of tomato would stand pruning and staking. The stakes should be 5ft. in height.

LONGWOOD, September 9th.—The meeting was held at the homestead of Mr. E. W. Beythien. The poultry plant was inspected, Mr. Beythien the while taking an opportunity of explaining his method of handling and feeding the birds. Mash was fed in the evening and grain thrown into the scratching pens overnight. Green feed constituted the midday meal. There were between 900 and 1,000 birds on the place, the cost of feeding per month being estimated at £14.

MORPHETT VALE, August 18th.—Mr. A. C. Pocock read a paper, "Breeding and Feeding Stock," in which he emphasised the principle that to be a successful breeder of stock a man must feed them properly. As a rule the more important lines, viz., horses, sheep, and cattle received a fair amount of attention, but the minor class, pigs, fowls, and calves were deserving of more consideration than they received.

PORT ELLIOT, September 16th.—A discussion took place on grasses and fodder crops, with special reference to light soils. Mr. P. R. Cudmore said that rye was one of the best early crops for sheep on scrub lands that had been cleared. It was agreed that fertilisers were necessary in growing fodder in that district.

STRATHALBYN, October 10th.—Mr. F. W. Allison read a paper on working petrol engines with kerosene, in which he said that with a kerosene attachment, petrol engines could be run more cheaply with kerosene than petrol. Mr. J. Saunders read a paper on pig raising, in which he described the good points and qualifications of the boar and sow and the feeding of the latter when she had farrowed.

## SOUTH-EAST DISTRICT.

### GLENCOE (Average annual rainfall, 33.84in.).

August 14th.—Present: six members.

**The Orchard on the Farm.**—Limiting his observations to the Glencoe district, Mr. J. T. Halliday read a paper dealing with the establishment of an orchard on the farm. The orchard block should be as near the homestead as possible, and the land should be ploughed two or three times, as deeply as possible, the deeper the better in order to permit the main roots to go down, an essential in the production of a strong tree and good fruit. Before planting, all the damaged roots should be pruned off with the cut slanting underneath. The hole should only be sufficiently deep to take the tree to the same depth as it was in the nursery. The custom of digging a hole two or three feet deep in heavy, hard soils was the cause of poor trees and small fruit, because the root, in striking out, came in contact with the hard bank of the hole, and being unable to penetrate it, trouble ensued. He preferred planting the trees 16ft. apart each way, which gave 196 trees to the acre. In that way the trees sheltered each other and there were not so many windfalls. With proper pruning to keep the tree short and sturdy, not only would a better class of fruit be obtained, but double the quantity. He had gathered five cases of fruit from trees only six feet through, and he had been able to gather all the fruit from the ground. The varieties he recommended were : Early—Emperor Alexander and Gravenstein; and for export, Jonathan, Rome Beauty, Dunn's Seedling, Cleopatra, and London Pippin. Mr. J. Dow considered Glencoe land too dear for commercial fruitgrowing, but he believed that the stringybark ranges surrounding Glencoe would prove splendid orchard land. Mr. Halliday said that he had planted half an acre with apples, and regretted that he had not planted 10 acres, because there was no more profitable land about.

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## GLENCOE (Average annual rainfall, 33.84in.).

September 18th.—Present: seven members.

Care and Management of Horses.—In an address on the care and management of horses, Mr. J. Riddoch said that for a farm horse he considered the Clydesdale the best, but as a number of mares in that district were on the light side it might be an advantage to have a Shire stallion to give bone and weight to the progeny. His experience was that the tendency was for stock to become light and weedy. A foal should be handled at six months and taught to be led and be tied up, but it should not be petted or it would become tricky. Horses should be broken in at 2½ years, but only given light work, because a horse was not fully developed until five years old. He preferred an open bridle for breaking in, but winkers should be used as soon as the horse was quiet. Teamsters should carry whips, because it was much better to give a horse the whip than to be continually jerking its mouth to urge it on. A young horse, if not inclined to start, should not be led, but should be compelled to start when spoken to, even if it were necessary to use the whip. The system of coupling teams with ropes from the bit to the next horse's hames was superior to coupling at the bits, because the horses were kept even in the team, and they did not jerk each other's mouths. Horses should be fed and watered regularly, and should be induced to drink before feeding. Horses should never be worked with sore shoulders. If fed properly and worked fairly they should keep in good health. Mr. F. A. Telfer believed in breaking in at 2½ years, and considered that a horse was then fit for any ordinary farm work. He stable fed his horses, grooming them at night, after they had dried off the sweat. He fed them on the best of chaff. Mr. J. T. Halliday had fed his horses on straw chaff, with some grain added. He did not feed when he knocked off for the day, but allowed the horses out to roll and feed about in the paddock until bed time, when he called them up and fed them on chaff, and his horses had never done better. For heavy work a horse broken in at five years would do five years' more work than if broken in at four years. Mr. A. Dow had not fed his horses on chaff at night time that season, and they were almost too fat now. Mr. T. F. Gratwick considered that horses needed plenty of good water, especially during hot weather.

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## KONGORONG.

October 10th.—Present: nine members.

Mixed Farming.—A paper on mixed farming was read by Mr. E. E. Morrison, who said that that district was ideal for that purpose. Sheep should be kept to feed off early crops and keep down weeds. Pigs were very profitable and it would pay to feed grain to them when the market was dull. Poultry and cows were most profitable if properly cared for and selected. Mr. W. A. Aslin had tried all branches of farming and there was profit in every one. There should be a butter or cheese factory in the district. Mr. A. C. Just emphasised the value of keeping poultry, and said that at Parafield the hens had averaged 8s. 11d. per annum profit. It paid to feed cows well. He had doubled his returns by improved feeding. Mr. S. C. Atkin said that a holding could not really be regarded as a farm in that district unless it was a mixed farm. Pigs paid well and every portion of the carcass could be utilised.

Crossbred Sheep in Kongorong.—Mr. N. J. Houston read a short paper on Crossbred sheep in Kongorong, in which he advocated the Lincoln-Merino cross. They did best in that district and were most profitable. The lambs matured very quickly and withstood the cold climate of that district better than any other breed. They were not troubled with burr or thistles, and the wool, though long, was beautifully clean. Mr. W. A. Aslin found that Crossbreds did better in that district, even if a little coarse in the wool. Mr. T. C. Atkin considered that lambs dropped in September did best. Late lambs paid very well. In answer to questions, Mr. Houston said that on the Mount Schank Estate it was claimed that the Dorset Horn was one of the best sheep for fattening. He did not think that Comebacks did as well as Crossbreds. Mr. A. C. Just was averse to mating young ewes in January, but preferred later on, because young ewes were so timid and frightened of the foxes and ran away from their lambs if scared, whilst old ewes protected their lambs.

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## KYBYBOLITE (Average annual rainfall, 22in.).

September 7th.—Present: 12 members.

Summer Crops.—Mr. L. S. Davie read a paper entitled "Summer Crops," as follows:—The principle underlying the successful growing of summer crops is that without irrigation there must be cultivation, and it is the recognition of this condition which makes all the difference between success and failure in districts suitable to their growth. The average monthly rainfall in this district for the growing period of summer crops is as follows:—November, 171 points; December, 134 points; January, 50 points; and February 87 points, making a total for the four months of 442 points. This amount in itself would be very inadequate for these crops grown in the hottest time of the year, but by means of cultivation, we can conserve, and make very good use of the ample winter rains, perhaps a good deal more than make up for the harm that excess of water may do at that period by consistent success in growing suitable summer crops. In writing this paper, I have no intention of enumerating the different summer crops which may or may not do well with us. I want to bring before you a few facts in connection with their cultivation in general, and more particularly to deal with the growing of kale. I am convinced that the great value of this plant to this locality has been conclusively demonstrated, it having been grown at the farm for several years with consistently good results. Particulars of the area sown last spring are very convincing in view of the fact that the driest summer on record was experienced, and yet the crop was wonderfully profitable, comparing well with previous experiences. The feeding of this crop, the seeding of which was completed on October 12th, 1915, has been as follows:—Up to September 6th, 1916, the 58 acres sown have carried exactly one sheep to the acre for each day. Taking into consideration the fact that the dryness of the summer made it undesirable to feed before May, thus allowing the plants to reach their full vigor, and that this long unproductive period has been included in the figures, the average of stock carried has been very good, although not up to what it could have been, as I have not been able to feed this crop up to its carrying capacity during the last two months. Recently I have been stocking three sheep to the acre, and have now increased to six, and I am not checking the growth, let alone eating it back; therefore it can be seen that the average number of sheep per day which is carried will steadily increase during the rest of the time which the land carries the crop, as the whole of that time will be productive, whereas the first two months were not. In the preparation of the land for kale or other summer crops I recommend that it be ploughed early in September or, in case of wet conditions, as early as possible. This would mean perhaps using the earliest fallow, but as the summer crops generally are fallow crops (of course kale is not) nothing is lost by this practice. By breaking up at the earliest possible date, the loss of soil moisture by evaporation is minimised, and the subsequent working will depend upon what is necessary to break up the formation of any surface crust, and produce the fine tilth necessary when sowing small seed. I think that frequent harrowings will in most cases produce the best condition of tilth without resort to any other implement after the plough. In sowing the kale last year I gave three harrowings before the drill and two after, but, of course, the thing is to produce the desired seed bed, and the style of implements that does it does not matter. A well-packed undersoil and a very fine surface tilth are the conditions desired, and if the land has been well prepared, the seeding can be carried out at the rate of 1lb. of seed to the acre, sown with a special drill, or mixed with the super. or bonedust in the ordinary drill, but, in the case of super. particularly, never before the day that it is sown. If the soil conditions are not really good, a slightly larger quantity, say 1¼lbs. per acre, will allow for some loss through bad germination. A proper condition of soil moisture is desirable at seeding, but should there be barely sufficient, the seed is fairly hardy, and germination will extend over several weeks with good results. However, if sown at the end of September, or shortly afterwards, there will be little danger of a poor germination through lack of moisture. The seeding must be done in rows, the usual practice being in every third hoe of the drill, thus allowing for the absolutely essential cultivation. The manuring must, of course, depend upon the farmer's capabilities, but the production will justify an equal expenditure with a cereal crop. The first cultivation must be made as soon as the rows can be plainly distinguished. This will eliminate weeds and leave the surface loose. Thereafter cultivations are only necessary when a surface crust has formed. The general practice of cultivation is by means of a Planet Junior. The kale crop, when properly handled, will last over two years, therefore, by growing a certain area, say 20 acres each year, in conjunction with early-sown oats for feeding purposes which could afterwards be left for hay if desired, as the kale will keep the sheep busy, keeping it from going to seed in the spring, the carrying capacity of the farm will be greatly increased. This heavier stocking of the land will tend to the more rapid improvement of its fertility, and thus there is a double source of increased profit, firstly from the greater number of stock, and secondly in the greater yields from the improved land. In feeding the kale, a commencement should not be made before the plant has become well established and of good growth. After that care must be taken not to feed down so hard as to let the sheep damage the buds in the axils of the leaves, *i.e.*, between the base of the leaf stalk and the main stem of the plant. It is from these buds that the new leaves will come. Feeding should be carried out throughout the winter, because during that season the mature leaves will die back quickly and waste if not used. It will also be found wise to feed hard in August because the plant will make such rapid growth in the spring that unless constantly fed back, it will run to seed, a contingency that should be avoided. I would advise keeping the crop fed right down regularly throughout the spring and summer, taking care not to damage the buds before mentioned. Maize, sorghum, and such plants can be successfully grown here in all but perhaps very exceptional seasons, but they must receive proper cultivation, for once they are started, that is the whole secret of success. It must be remembered that these seeds require hot weather to germinate them, and they will quickly spoil if sown too early. To guard against loss of seed it would be well to keep it until the next year rather than put it into the ground when there is insufficient soil moisture for immediate germination.

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### NARACOORTE (Average annual rainfall, 22.60in.).

August 12th.—Present: 25 members.

VEGETABLES: THEIR GROWTH, DISEASES, AND PESTS.—Mr. Johnstone contributed a paper. "The first element to the successful cultivation of the cabbage," he said, "is a good and fairly rich seed bed, so that the growing plants may vegetate quickly and strongly. The next element is a good and deeply cultivated plot, wherein to transplant them. Cabbages and cauliflowers are voracious feeding plants, and require a fast growth without check. The manure is best given to them in a fresh state. Mark out the ground in 2ft. rows, and, having done so, commence by digging out the first row to a spit in depth, putting the soil where the operator intends to finish the work; then with fresh stable and cow manure line the open trench to a thickness of a few inches. Stir with a fork the manure into the bottom of the trench, and, if possible, incorporate it with the substrata. Then proceed to open the second trench, filling up the first with soil. Having done so, plant out the young cabbages 18in. apart, and so on to the finish. Then with the transported soil fill up the last trench, and plant the last line. The ground between the rows can be dug afterwards, or when the young plants have begun to grow.

They are attacked by insects, parasites, and grubs, but as to organic disease, if they are grown quickly they will be healthy. Shortly after the operation of transplantation, they may be attacked by the brown grub. The grubs are best destroyed by hand from around the stem of the beheaded plant. Scratch away the soil, where the pest will invariably be found. Then there are the slug and the snail. As they commit their depredations in the dark they may be effectually cleared by dusting after sunset with atmospheric slacked lime, or equal quantities of wood ashes and lime. If mildew appears, dust with sulphur and stir the ground between the rows in order to put more growth into the plants and aerate the soil, and, in that way, draw off some of the superabundant moisture. Then there is the cabbage fly, or aphis. As this pest breathes through the epidermis it follows that the most expeditious way to get rid of it is by choking, therefore, when the leaves are damp, dust the plants well with soot, lime, or wood ashes. The caterpillars also may be effectually dealt with in the same manner. The wire-worm attacks the plants at the roots, and it is a troublesome pest to get rid of. Digging in spent lime from a gas works is a good cure. Here we cannot get that, but to apply water poured from off gas tar will be found a good substitute; as also to dig in refuse from an acetylene gas plant. But, as a general preventive at digging time, and where wire-worms are found, use a good dressing of agricultural lime.'' He then described various insect pests and their treatment, and continued:—''My few notes with regard to cultivation may apply to the whole of the brassica, only that cauliflower, broccoli, and Brussels sprouts should be given a distance of 2ft. in the rows, and in the case of large-growing cabbages, such as Henderson's Succession and the Drumhead varieties, they also should be given a distance of 2ft., but in the case of such as Enfield or London Market 18in. will be sufficient. I have here a table of analysis of the ash of the leaves which is given as a guide to a complete manure for the cabbage. It is as follows:—Potash, 11.70; soda, 20.42; lime, 20.97; magnesia, 5.94; oxide of iron, 0.60; phos. acid, 12.37; sulphuric do., 21.48; chlorine, 5.77; silica, 0.75. From the above it will be seen that lime, soda, and sulphuric acid occur in nearly equal amounts, and form the principal inorganic constituents of the plant, therefore, in addition to the organic manure which supplies the humus, I would add a dusting of lime and superphosphate—a plan I employ if ingredients are at hand, and find the crop respond in yield for the extra care given to its requirements. During growth the ground should be frequently stirred with a Dutch hoe or fork to aerate the soil. Keep down weeds and so enable the crop to get the full benefit of the manure, that the maturing season may not be prolonged, for the quicker the growth the better and more succulent will be the produce. Of course, those remarks apply to the garden cultivation only of the vegetable. If grown on the farm by the acre the manure must be spread on the ground, and with the ploughing become incorporated with the soil. A double-moulded plough should be used. In such case, the ground would be ploughed first in an opposite direction to that of the rows of the future crop. Then the double-moulded plough would be used to open the rows in which the manure would be spread, then return between those rows, in which operation the manure would be covered, and the ground made ready for the plants. In either case there should be deep cultivation. If potato growers followed this system of the double ploughing and double-moulded plough, they would, I am sure, increase their returns by a very considerable amount. As most proprietors of a garden grow peas, a few remarks on the cultivation of this most nutritious vegetable may not be amiss. The pea (*Pisum savitum*) is supposed to be a native of the Levant, where the common grey field pea—supposed to be the parent of garden varieties—is found wild. A rich calcareous friable loam is an ideal soil for its successful cultivation, and if lime is not a principal ingredient of its composition it may be added in the form of lime, chalk, or gypsum. It also should be deep, so that the roots may penetrate easily downwards to obtain moisture in time of drought, otherwise the foliage will be liable to attacks from mildew, and, if the plants once get too dry while in flower the pods will not fill. I invariably put the crop in trenches, putting the manure—preferably half rotted—about 8in. below the surface. The rows should be a little wider apart than the height to which the particular variety is said to grow, and, if the material is available, it always pays to stick them or run them up on wire-netting. If artificial manure be used care must be taken that it is well down from the seed, because if brought too early in contact with the radicle, as it strikes downwards, it is apt to burn. It may be generally stated that the young plant for a considerable time of its growth draws its sustenance from the seed pea, and until that has been used, does not really require manure. I have found in practice that the best results are got from the use of good rotted farmyard manure dug well into the bottom of the trench. Sow the seed from 3in. to 4in. in the ground. As a member of the family leguminosæ, all of which are rich in food, either for man or beast—as instance lucerne, lentils, clover, tares, lupins, &c.—the pea probably comes nearer to a complete food for man than any other product of the garden, and according to analysis it is richer in the dry state than in the green. It is subjected to the attacks of birds, mice, mildew, and those pests common to the other vegetables mentioned, and the same remedies wlll apply; in the case of mice, a dusting of red lead over the seed will stop them, a covering of sand will also stop them from smelling the pea.

## SANDALWOOD.

September 9th.—Present: 17 members.

Pigs on the Farm.—After describing the different breeds of pigs, Mr. C. A. Ritchie, in a paper entitled "Pigs on the Farm," recommended the Mid York. It was important that the pigs should have comfortable quarters, built of stone if possible. Each house should be 9ft. x 9ft., to give the sow room to move about and lie down, without overlaying any of her young. He found pigs very cleanly in their habits, only fouling one corner of the sand floor. Therefore there was no necessity for paving, which made it essential to supply bedding. The only spot requiring paving was that on which the feeding trough stood. The yard for breeding pigs should be as large as it was possible to make it, or else an opening should be left so that the young might have a scamper. If the yard was small, the sow should also be allowed to have a run for an hour or so every day. If a stump house were built, he would advise banking it up with sand to keep the draught off the young pigs, which otherwise were apt to get chilled and die. The pigs should be fed regularly on ground barley or wheat, with skim milk and house refuse. It was wasteful to feed whole grain to pigs because so much of it passed through them undigested. A small, shallow feeding dish should be provided for the litter when a fortnight old, and they should be given scalded bran with a little pollard and skim milk, because that tended to relieve the strain on the sow of suckling a big litter. The dish should be placed outside the yard, so that the sow could not get it. An allowance of bran in the sow's feed greatly increased the milk supply.

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MOUNT GAMBIER, September 16th.—The meeting discussed at great length the proceedings at the congress in Adelaide. At a previous meeting Mr. T. C. Ellis contributed a paper dealing with the suggested measures to prevent the slaughter of female stock. He contended that the best interests of the industry were conserved by allowing the breeder a free hand.

SANDALWOOD, October 7th.—Mr. D. J. Hood read a paper on the most suitable machinery for harvest work in that district, recommending the twine binder for dealing with the hay crop and the stripper for the wheat crop, although in land from which the stumps had been removed, and where the crop was fairly even and a good even team could be obtained, a harvester could be used to advantage. For cleaning wheat, a hand power winnower driven by a 1½-h.p. petrol engine was suitable to deal with 800 bags. If there were more than that amount, a power winnower could be used to advantage.

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CLARENCE GOODE,
*Minister of Agriculture.*

# POINTS FOR PRODUCERS.

**English Apple Market.**

The first shipment of Californian apples arrived on the market this week, says the Trade Commissioner, in his report dated October 5th. The consignment comprised boxed and barrelled fruit, first, second, and third grade, and the varieties were confined principally to Gravenstein, Emperor, New Town Pippin, and Ribstone Pippin. The shipment landed in very good condition, and the better varieties in cases are making from 11s. 6d. to 12s. per box, with barrels realising from 24s. number ones, 18s. to £1 number twos, and 15s. to 16s. number threes. The cased apples are all wrapped with a much heavier paper than that which is used in South Australia, but contain no wood wool. The apples carry splendidly, and show no signs of bruising. This is due to a very large extent to the use of heavier paper. The cases also are different in shape from the South Australian. An interesting feature is that, without exception, each consignor uses paper labels. The shippers are practically all co-operative societies, and the uniformity of grading, packing, and get up generally is remarkably good. The barrelled apples are unwrapped, and have no packing whatever to protect them from the sides of the barrel. They are pressed into the barrels with some considerable force before being headed up.

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**Ringing Fruit Trees.**

With the object of testing the value of ringing (*i.e.*, removal of a complete ring of bark) fruit trees with respect to their productiveness, experiments were carried out during 1910-1913 at the New York Agricultural Experimental Station with apple, pear, plum, and cherry trees. The results showed, according to the Bulletin of the International Institute of Agriculture, that under certain conditions ringing may induce and possibly increase fruitfulness of apples, but it rarely has these favorable effects on other fruits. The removal of narrow strips of bark is less injurious to plant growth than taking out wide rings. The practice should never be followed with stone fruits, and only on young and very vigorous apple trees. The operation had no effect on the size, color, or maturity of the apples, and the roots were diminished in size and vigor. This practice has received attention in South Australia, and the Horticultural Instructor (Mr. Geo.

Quinn) states that in the case of oranges a noticeable improvement in the bearing followed ringing. Australian navels, which are notoriously bad in setting their fruit, when treated in this manner, were found to produce crops of exceptionally large thick-skinned oranges. In fact, in one instance it was found that 28 fruits from trees that had been treated to the ringing process completely filled a one-bushel case.

### South Australian Soldiers' Fund.

Among the resolutions passed by the last congress of the Agricultural Bureau is one that will commend itself to all farmers in South Australia. At that gathering unanimous assent was given to a proposal that every Agricultural Bureau member should set aside a definite acreage of the coming harvest, the proceeds from which should be devoted to the South Australian Soldiers' Fund. Last year a similar arrangement resulted in a considerable sum being donated for the relief of the Belgians. There is every reason to expect that the response this year will be as ready. The duty of Australia to those who have taken their place in the battle front is paramount, and this appeal, coming from the farmers themselves, will be responded to with that enthusiasm which it warrants.

### Imports of Plants, Fruit, Etc.

During the month of October, 1916, 1,320bush. of fresh fruits, 18,536bush. of bananas, 17,689 bags of potatoes, 830 bags of onions, 570pkgs. of vegetables, 129pkgs. of plants, trees, etc., were examined and admitted at Adelaide and Port Adelaide under the "Vine, Fruit, and Vegetable Protection Acts of 1885 and 1910"; 168bush. of bananas and 13bush. of oranges (over ripe) were destroyed, and 57bush. of oranges were fumigated. Under the Federal Commerce Act 315bush. of fresh fruit, 11,709pkgs. of dried fruit, and 15pkgs. of preserved fruit were exported to oversea markets. These were consigned as follows:—For London, 5,620pkgs. of dried fruit; for New Zealand, 315 cases of citrus fruit, 1,710pkgs. of dried fruit; for Vancouver, 4,375pkgs. of dried fruit; for India, 15pkgs. preserved fruit and 4pkgs. of dried fruit. Under the Federal Quarantine Act 808pkgs. of plants, trees, bulbs, etc., were examined and admitted from oversea sources; 15lbs. of Soya beans from United States of America were cleaned at the Plant Quarantine Depot on account of the presence of proclaimed weed seeds.

### Horses and Harvest.

With the advent of the harvest, it is well to remind farmers that there are several little points in connection with the management of horses that cannot be neglected with impunity. A too frequent practice is to keep the harvester working too late at night to enable the horses to dry off and rest properly before the next day's work, as a result of which occur digestive troubles, and also rheumatic lamenesses. It is also advisable to let the animals have a drink in the middle of the day, even if it is not a full drink and has to be carted out to them, says the Veterinary Lecturer. In cases where this is neglected there is a danger of the animals drinking to excess when the day's work is done, and as a result digestive derangement, including stoppage and colic, may result.

### Pigs.

That the pig is naturally a grazer is too frequently overlooked, and neglect to bear this fact in mind is at times responsible for loss. This point was emphasised by the Veterinary Lecturer (Mr. F. E. Place, B.V.Sc., M.R.C.V.S.) in replying to a correspondent who reported that a young boar was troubled with constipation, straining, and protrusion of the bowel. The condition of the animal varied, better, then worse, for a week, and it finally died after a cold night. *Post mortem* inspection revealed congestion of all organs, especially bladder and liver, in which were gritty lumps. The trouble was that the pig was killed by kindness, otherwise acute indigestion complicated by worms in the liver—the gritty nodules—said Mr. Place. Pigs are naturally grazers, and young pigs confined and stuffed sometimes give out in this way. A little—an ounce or two—of Epsom salts occasionally in the food, or a similar quantity of sulphur, in addition to the charcoal will generally keep matters right. In acute cases such as this a tablespoon of glycerine given as an enema will afford relief.

### Publication Received.

"Nature in Farming," a discussion of scientific principles in their relation to farm practice, by John W. Paterson, B.Sc., P.L.D., Professor of Agriculture in the University of Western Australia.—Lothian Book Publishing Coy., Proprietary, Limited, Melbourne.

## DESTROYING CATERPILLARS.

A number of caterpillars belonging to a species of the cutworm moth were forwarded by a correspondent for identification, and advice as to a means of effecting their destruction. The Horticultural Instructor, in replying, said the pests might be poisoned either by spraying the trees or plants with arsenate of lead, using about an ounce to the gallon of water, or by making a bran and paris green mash in the proportion of an ounce of paris green to 2lb. of bran, using enough dissolved molasses or brown sugar in the hot water to make it into an adhesive mash. That was placed about the trees or plants on the ground in small lumps, and the caterpillars displayed a great partiality for it. The poison might be sown over beds of onions and similar vegetables which were attacked by the pests.

# INQUIRY DEPARTMENT.

**Any questions relating to methods of agriculture, horticulture, viticulture, dairying, &c., diseases of stock and poultry, insect and fungoid pests, the export of produce, and similar subjects, will be referred to the Government experts, and replies will be published in these pages for the benefit of producers generally. The name and address of the inquirer must accompany each question. Inquiries received from the question-boxes established by Branches of the Agricultural Bureau will be similarly dealt with. All correspondence should be addressed to "The Editor, *The Journal of Agriculture*, Adelaide."**

## VETERINARY INQUIRIES.

[Replies supplied by Mr. F. E. PLACE, B.V.Sc., M.R.C.V.S., Veterinary Lecturer.]

[Extraordinary pressure on space has rendered it necessary to very considerably curtail the inquiry department. Replies to those questions of more general interest only have been published; however, every query received has been replied to through the post.—ED.]

"D. & E. M.," Mundalla, advise that a cow suddenly went off milk and appetite, fidgetty when being milked; dung rather dry.

Reply—The symptoms point to that form of digestive paralysis often called dry bible, and it would be well to give her a daily dose of a pint of yeast in a quart of milk, and if possible, to change her pasture and put her on lucerne or similar feed. After three days give her twice a day 30 drops tincture bryonia in a little water for a week, and then 30 drops tincture nux vomica twice daily for a week.

"J. C. F.," Koonibba, reports a cow, restless and irritated udder, then blotches appear on udder and teats; seem to work out to skin, crack, and go into a big scab.

Reply—A good description of cowpox, which is highly infectious both to cows and human beings. Give the cows a teaspoonful of cream of tartar, or as much as will lie on a 3d. bit of tartar emetic once or twice a day for a few days. Dress the teats after milking with boracic ointment, strength 1 to 4, and then paint them over with collodion, or what is cheaper and just as effective, oak varnish and castor oil in equal parts. Only handle the affected ones after finishing the healthy, and always wash the hands after with a disinfectant soap.

"Reject," Curramulka, reports that a draught colt 14 months, died three days after castration, bled a little after operation, not alarmingly; left testicle difficult to hold. P.M.—Abdomen full of blood and leak in right artery, the end of which as with the left, was properly closed, there was slight swelling of both right and left vessels at point where leak occurred.

Reply—This was a case of aneurism, and the most common cause of the trouble is verminous, possibly months before the operation. The death could not have been foreseen or prevented, and as the internal hæmorrhage could only be surmised from the increasing weakness and pallor of the eyes little could have been done. Really hot fomentations of the loins and the administration of 10 drops of tincture arnica every three hours may be of use.

"Reject" Curramulka, states that a colt, four or five hours after castration, started to drop blood about 60 drops per minute, and kept on for some hours.

Reply—The bleeding in this case was venous, and probably arose from some exertion on the colt's part about the time it commenced. Unless more than three quarts are lost it is not necessary to take any measures, but if there if a weak pulse and signs of collapse before that it is as well to give arnica as mentioned in previous reply, and possibly to stuff scrotum with a wad of tow soaked in a 5 per cent. solution of the same. As a rule more damage is done by exciting the colt than by waiting, but each case has to be treated on its merits.

"A. S.," Wollowa, has a horse with heel broken off.

Reply—The best way of treating this will be to bandage with Stockholm tar and bran bag, changing about once a fortnight till the hoof grows down about ½in., then tar only.

"W. E. B.," Riverton, has a cow, third calf, with lump at top of teat.

Reply—There is an abscess, and it would be well to open it; it will become fibrous and stop the passage altogether. A teat syphon will enable you to get the milk temporarily, but it would seem that an operation is necessary to cure. A lotion of a teaspoonful of boracic acid in a pint of warm water will be the best dressing. Do not use the milk from that quarter until it has been boiled, even for pigs. The cheapest course will be to let that quarter dry off.

"G. E.;" Mildura, has foal with soft lump in scrotum.

Reply—This is probably scrotal hernia (rupture), leave till two years before castrating, but if very bad, as big as a wheelbarrow, operate now by covered method; do not cut inner skin (*tunica vaginalis*) but sew up after removal of testicle; ditto skin, make a truss of wool and keep in position till well. In many cases the trouble disappears during the first year.

"G. F.," Gumeracha, has a foal three weeks, with crooked leg.

Reply—The leg will in all probability straighten as the foal grows; if not the local blacksmith would be able to make a light splint out of hoop iron; this should not be resorted to too early. A teaspoon of syrup of phosphate of iron (Parrish's food) twice a day would probably help matters.

"T. S.," Blanchetown, reports that a cow has difficulty in chewing.

Reply—As she is young the teeth are probably in fault; gag her mouth open with a billet of wood and feel them. Probably temporary shells have to be taken off, which can be done with the fingers. Have a good billet, a young cow can bite hard.

"H. N. G.," Jabuk, reports that a foal swelled up after birth, shivered, fell if exerted, and recovered.

Reply—Before an animal breathes there is a valve in the heart (*foramen ovale*) which acts as a by-pass for the blood. As soon as separate existence is set up this should close. In this case it did not for some days. There will not be any bad effects, and no treatment is necessary. The oil given was helpful.

"Rusticus," Salisbury, has a young horse, first season work, lump on point of shoulder.

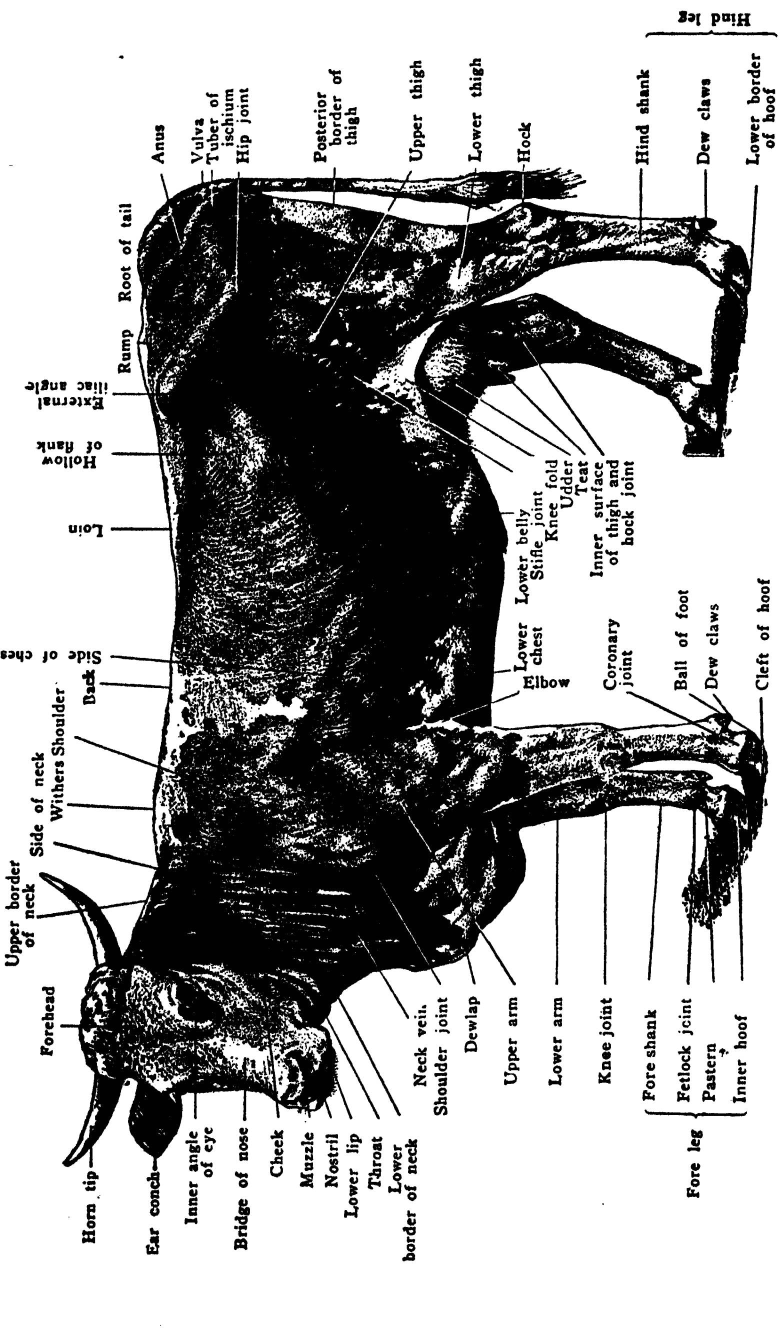
Reply—The lump is suggestive of a serous swelling, due to a misfitting collar. Drive a knife into the lower hindpart of it, and see what comes out. Dress it three times a day with lotion made of 1oz. tincture arnica to 1 pint methylated spirit. If you would like the Veterinary Lecturer to see it and advise, if you will communicate with him he will arrange to do so one day when returning to town from a northern trip.

"W. H.," Wilmington, states that ponies go stiff on ripening feed, and muscles of neck become very hard.

Reply—The condition is due to the character of the feed, and it would be well to feed wet bran freely as well. Give 10 drops of tincture rhus toxicodrendron morning and evening for a fortnight, and rub the muscles daily with a liniment composed of equal parts strong ammonia, vinegar, camphor, methylated spirit, and white of egg, with a dram of tincture rhus tox. to the 6ozs. of liniment.

"R. S. K.," Petersburg, reports a bay buggy pony lame in off hind at starting, on rough road carries leg like a lame dog for a while, on turning round sharply goes lame for a few steps. No heat or pain or swelling about leg.

Reply—The symptoms so carefully observed and well described enable one to say almost definitely that the pony is suffering from spavin, a bone disease of the hock, which is difficult for an amateur to see or detect. If this is the case the trouble is permanent, and treatment only palliative, not curative; but as the disease progresses the joint becomes permanently stiff, and so the lameness is not so noticeable. If desired you may blister the inside of the hock joint with red blister once every three weeks, spelling in the meantime.



External topographic anatomy.

# ROSEWORTHY AGRICULTURAL COLLEGE.

## SIXTH REPORT ON THE PERMANENT FIELD EXPERIMENTS, SEASONS 1904-1915.

[By WALTER J. COLEBATCH, B.Sc., M.R.C.V.S., Principal, Roseworthy Agricultural College, and R. C. SCOTT, Assistant Experimentalist.]

*(Continued from page 276.)*

### 2. NITROGENOUS FERTILISERS.

In contradistinction to phosphates, nitrogenous fertilisers exert more influence on the vegetative development than on the formation and maturation of the grain, and it is a reasonable supposition, therefore, that any benefits accruing from nitrogenous applications will be more pronounced in hay crops than in crops harvested for grain.

In connection with nitrogenous fertilisers, consideration of residual effects is not called for, as the soil possesses little, if any, retentive powers for nitrogen, any excess over and above the crops' requirements being discharged in solution in the effluent waters.

Trials of a temporary character have been repeated from time to time with various kinds of nitrogenous manure in various parts of the State, and nearly always with negative results, although in some of the lighter districts applications made at the end of the winter have in some seasons completely transformed the color and general character of backward wheat crops. Of the nitrogenous manures available to us, namely, nitrate of soda, sulphate of ammonia, nitrate of lime, nitrolem, and dried blood, the two most generally used—nitrate of soda and sulphate of ammonia—have been submitted to investigation in the Roseworthy system of permanent experiments.

### (*a*) NITRATE OF SODA.

This is one of the most costly manures in the market, and for that reason, as well as on other grounds, it is highly important that the correct amount to apply should be determined within narrow limits. The lowest amount per acre included in our trials is 28lbs., and the highest is 1cwt. There is also a ½cwt. plot, a 1cwt. plot applied in the autumn, and a 1cwt. plot in which the phosphatic dressing is raised to 3cwt. per acre. For the sake of clearness, therefore, we will discuss this subject in three sections:—

(1) Quantitative experiments.

(2) Effect of increased phosphatic dressing.

(3) Season at which manure should be applied.

The quantitative experiments to be considered comprise trials with ¼cwt., ½cwt., and 1cwt. of nitrate of soda, applied in the autumn in conjunction with the usual 2cwts. of superphosphate per acre. The following are the results:—

TABLE XXIV.—*Showing Returns from Wheat Dressed with Superphosphate and Nitrate of Soda Comparatively with those from Wheat Dressed with Superphosphate alone,* 1905-15.

| Years. | GRAIN YIELDS. | | | | TOTAL PRODUCE YIELDS. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2cwts. of Superphosphate. | | 2cwts. Superphosphate and 1cwt. of Nitrate of Soda. | | 2cwts. of Superphosphate. | | | 2cwts. Superphosphate and 1cwt. of Nitrate of Soda. | | |
| | Bush. | lbs. | Bush. | lbs. | T. | C. | L. | T. | C. | L. |
| 1905 | 32 | 12 | 36 | 1 | 3 | 3 | 107 | 3 | 4 | 107 |
| 1906 | 20 | 48 | 22 | 27 | 2 | 1 | 64 | 2 | 3 | 44 |
| 1907 | 20 | 48 | 20 | 29 | 1 | 7 | 108 | 1 | 8 | 95 |
| 1908 | 29 | 27 | 33 | 26 | 2 | 9 | 58 | 2 | 15 | 8 |
| 1909 | 28 | 1 | 34 | 45 | 2 | 9 | 66 | 3 | 2 | 61 |
| 1910 | 24 | 53 | 25 | 48 | 2 | 12 | 65 | 2 | 16 | 22 |
| 1911 | 11 | 43 | 21 | 10 | 1 | 5 | 45 | 1 | 16 | 62 |
| 1912 | 20 | 34 | 20 | 14 | 1 | 10 | 84 | 1 | 10 | 76 |
| 1913 | 6 | 29 | 6 | 14 | 0 | 12 | 96 | 0 | 12 | 37 |
| 1914 | 6 | 22 | 6 | 24 | 0 | 3 | 63 | 0 | 6 | 88 |
| 1915 | 28 | 42 | 29 | 25 | 2 | 7 | 18 | 2 | 11 | 64 |
| Means | 20 | 54 | 23 | 18 | 1 | 17 | 28 | 2 | 0 | 91 |
| Means—Hay equivalent | — | | — | | 2 | 5 | 48 | 2 | 9 | 86 |

TABLE XXV.—*Showing Results from Wheat Dressed with ¼cwt. of Nitrate of Soda and 2cwts. Superphosphate, Comparatively with Wheat Dressed with 2cwts. Superphosphate alone,* 1906–15.

| Years. | GRAIN YIELDS. | | | | TOTAL PRODUCE YIELDS. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2cwts. of Superphosphate. | | 2cwts. Superphosphate and ¼cwt. of Nitrate of Soda. | | 2cwts. of Superphosphate. | | | 2cwts. Superphosphate and ¼cwt. of Nitrate of Soda. | | |
| | Bush. | lbs. | Bush. | lbs. | T. | C. | L. | T. | C. | L. |
| 1906 | 20 | 49 | 20 | 51 | 2 | 11 | 60 | 2 | 3 | 108 |
| 1907 | 14 | 58 | 17 | 48 | 0 | 19 | 13 | 1 | 3 | 10 |
| 1908 | 38 | 20 | 37 | 46 | 3 | 1 | 111 | 2 | 18 | 32 |
| 1909 | 31 | 2 | 33 | 40 | 2 | 15 | 66 | 2 | 11 | 49 |
| 1910 | 19 | 11 | 19 | 0 | 2 | 3 | 76 | 2 | 8 | 82 |
| 1911 | 17 | 32 | 13 | 42 | 1 | 13 | 12 | 1 | 8 | 85 |
| 1912 | 19 | 5 | 15 | 20 | 1 | 8 | 45 | 1 | 5 | 86 |
| 1913 | 8 | 35 | 9 | 7 | 0 | 16 | 85 | 0 | 16 | 93 |
| 1914 | 16 | 47 | 16 | 10 | 1 | 4 | 76 | 1 | 3 | 104 |
| 1915 | 22 | 56 | 22 | 38 | 2 | 2 | 12 | 1 | 18 | 66 |
| Mean | 20 | 55 | 20 | 36 | 1 | 17 | 78 | 1 | 15 | 105 |
| Mean—Hay equivalent | — | | — | | 2 | 5 | 109 | 2 | 3 | 93 |

TABLE XXVI.—*Showing Results from Wheat Dressed with ½cwt. of Nitrate of Soda and 2cwts .of Superphosphate, Comparatively with Wheat Dressed with 2cwts. of Superphosphate alone*, 1912-15.

| Years. | GRAIN YIELDS. | | | | TOTAL PRODUCE YIELDS. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2cwts. Superphosphate. | | 2cwts. Superphosphate and ½cwt. of Nitrate of Soda. | | 2cwts. Superphosphate. | | | 2cwts. Superphosphate. and ½cwt. of Nitrate of Soda. | | |
| | Bush. | lbs. | Bush. | lbs. | T. | C. | L. | T. | C. | L. |
| 1912 ........................... | 19 | 5 | 21 | 58 | 1 | 8 | 45 | 1 | 12 | 93 |
| 1913 ........................... | 8 | 35 | 9 | 28 | 0 | 16 | 85 | 0 | 17 | 28 |
| 1914 ........................... | 16 | 47 | 15 | 44 | 1 | 4 | 76 | 1 | 1 | 20 |
| 1915 ........................... | 22 | 56 | 21 | 49 | 2 | 2 | 12 | 2 | 18 | 37 |
| Means........................... | 16 | 51 | 17 | 15 | 1 | 7 | 110 | 1 | 12 | 44 |
| Means—Hay equivalent ............ | — | | — | | 1 | 14 | 14 | 1 | 19 | 56 |

In calculating the net values of the above tables, nitrate of soda has been assumed to be worth 14s. per cwt. Owing to the brief period over which the trial with ½cwt. has extended, any comparison in which this dressing is included must be viewed as inconclusive; however, if we take cognizance only of the differences between the mean yields on the top-dressed plots and their respective check plots, we arrive at the following results:—

TABLE XXVII.—*Showing Differences between Various Plots receiving 2cwt. of Superphosphate Per Acre, plus Different Quantities of Nitrate of Soda and Adjacent Check Plots Receiving 2cwts. of Superphosphate alone.*

| | 2cwts. Superphosphate per Acre plus | | |
|---|---|---|---|
| | ¼cwt. Nitrate of Soda. | ½cwt. Nitrate of Soda. | 1cwt. Nitrate of Soda. |
| Difference in grain yield .............. | – 0bush. 19lbs. | 0bush. 24lbs. | 2bush. 24lbs. |
| Value .............................. | – 1/1 | 1/5 | 8/5 |
| Net profit or loss ..................... | – 4/7 | – 5/7 | – 5/7 |
| Difference in hay yield ................ | – 2cwts 16lbs. | 5cwts. 42lbs. | 4cwts. 38lbs. |
| Value .............................. | – 3/9 | 9/5 | 7/7 |
| Net profit or loss ..................... | – 7/3 | 2/5 | – 6/5 |

It is somewhat difficult to extract from these results any evidence in support of the use of nitrate of soda in this district for either grain or hay crops. We have reason to believe that light dressings on the sandy soils have given payable results on crops that have been "hanging fire," but on our stiffer lands the only instance of a payable response within our knowledge is the 2s. 5d. per acre appearing in the above table to the credit of the half cwt. dressing, and this is largely discounted by the fact that it represents the average of only four crops.

2. The effect of increasing the amount of superphosphate can hardly be commented upon with advantage at present, as the plots were started in 1912. The results are recorded below, and it will be noticed in passing that, up to the present, the additional superphosphate has had very little effect on grain production, but appears to have improved the hay yield.

TABLE XXVIII.—*Showing Results from Wheat Dressed with* 3*cwts. Superphosphate and* 1*cwt. of Nitrate of Soda, Comparatively with Wheat Dressed with* 2*cwts. of Superphosphate alone,* 1912-15.

| Years. | GRAIN YIELDS. | | | | TOTAL PRODUCE YIELDS. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2cwts. Superphosphate. | | 2cwts. Superphosphate and 1cwt. of Nitrate of Soda. | | 2cwts. Superphosphate. | | | 2cwts. Superphosphate and 1cwt. of Nitrate of Soda. | | |
| | Bush. | lbs. | Bush. | lbs. | T. | C. | L. | T. | C. | L. |
| 1912 | 19 | 5 | 25 | 14 | 1 | 8 | 45 | 1 | 17 | 41 |
| 1913 | 8 | 35 | 8 | 39 | 0 | 16 | 85 | 0 | 17 | 81 |
| 1914 | 16 | 47 | 16 | 32 | 1 | 4 | 76 | 1 | 5 | 53 |
| 1915 | 22 | 56 | 25 | 9 | 2 | 2 | 12 | 2 | 15 | 95 |
| Means | 16 | 51 | 18 | 53 | 1 | 7 | 110 | 1 | 14 | 11 |
| Means—Hay equivalent | — | | — | | 1 | 14 | 14 | 2 | 1 | 65 |
| Difference | — | | 2 | 2 | — | | | 0 | 7 | 51 |
| Value | — | | 7/1 | | — | | | 13/1 | | |
| Profit or loss | — | | -11/5 | | — | | | -5/5 | | |

3. The season at which nitrate of soda should be applied.—Being a very soluble manure, nitrate of soda is easily washed out of reach of the roots if applied before the plants have taken firm hold of the soil. In humid climates the winter rains cause such serious leakage of nitrate nitrogen that nitrate of soda is almost invariably held back till the spring, and then broadcasted over the growing crop. Although the total rainfall here is relatively small, as a general rule most of it falls during the winter and the possibility of it being sufficiently heavy to leach out nitrates applied at seeding time led to the inclusion of a plot in which the nitrate of soda is not applied till the first week in August. This test has been carried out with 1cwt. dressings of nitrate of soda

in combination with 2cwt. of superphosphate per acre. The results obtained are as under:—

Table XXIX.—*Showing Returns Obtained from Plots Dressed with 2cwts· of Superphosphate and 1cwt. of Nitrate of Soda at Seeding, Comparatively with those Obtained on Plots Dressed with 2cwts. of Superphosphate and 1cwt. of Nitrate of Soda in Spring.*

| Years. | GRAIN YIELDS. | | | | TOTAL PRODUCE YIELDS. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2cwts. Superphosphate and 1cwt. of Nitrate of Soda at Seeding. | | 2cwts. Superphosphate and 1cwt. of Nitrate of Soda in Spring. | | 2cwts. Superphosphate and 1cwt. of Nitrate of Soda at Seeding. | | | 2cwts. Superphosphate and 1cwt. of Nitrate of Soda in Spring. | | |
| | Bush. | lbs. | Bush. | lbs. | T. | C. | L. | T. | C. | L. |
| 1905 | 36 | 1 | 34 | 26 | 3 | 4 | 107 | 2 | 19 | 62 |
| 1906 | 22 | 37 | 23 | 32 | 2 | 3 | 44 | 2 | 5 | 14 |
| 1907 | 20 | 29 | 19 | 31 | 1 | 8 | 95 | 1 | 5 | 51 |
| 1908 | 33 | 26 | 32 | 34 | 2 | 15 | 8 | 2 | 16 | 97 |
| 1909 | 34 | 45 | 36 | 46 | 3 | 2 | 61 | 3 | 6 | 95 |
| 1910 | 25 | 48 | 23 | 24 | 2 | 16 | 22 | 2 | 12 | 62 |
| 1911 | 21 | 10 | 22 | 11 | 1 | 16 | 62 | 1 | 17 | 81 |
| 1912 | 20 | 14 | 20 | 47 | 1 | 10 | 76 | 1 | 12 | 37 |
| 1913 | 6 | 14 | 5 | 27 | 0 | 12 | 37 | 0 | 12 | 3 |
| 1914 | 6 | 24 | 6 | 2 | 0 | 6 | 88 | 0 | 8 | 26 |
| 1915 | 29 | 25 | 28 | 40 | 2 | 11 | 64 | 2 | 10 | 79 |
| Means | 23 | 18 | 23 | 2 | 2 | 0 | 91 | 2 | 0 | 76 |
| Mean—Hay equivalent | — | | — | | 2 | 9 | 86 | 2 | 9 | 68 |
| Differences | 0 | 16 | — | | 0 | 0 | 18 | — | | |
| Value | 11d. | | — | | 3d. | | | — | | |

It would be possible, of course, to continue this trial for another decade, or even longer, if by doing so any useful purpose might be served. It may be fairly claimed, however, that the original object in view has now been achieved, for we find that after 10 years the differences between the returns from the two practices compared are negligible, and consequently it may be regarded as being immaterial which period is selected for the broadcasting of the manure. The convenience of completing the seeding operations at one time will probably determine the season at which it will be applied.

### (*b*) Sulphate of Ammonia.

Sulphate of ammonia is not so readily soluble as nitrate of soda, and the soil is better able to fix it, as very little leaching occurs until reaction with the soil carbonates and the conversion of the ammonia into nitrate nitrogen have taken place. Obviously, then, sulphate of ammonia requires to be autumn or winter sown, for if application be deferred to the spring there would be a grave danger of these chemical changes being too gradual under our climatic conditions to permit of the liberation of the nitrogen in an available state in time to be of service to the crop.

The general effects of sulphate of ammonia are akin to those produced by nitrate of soda, although the latter acts much more rapidly, and, under dry conditions, much more certainly. As already pointed out, however, the growing period of our crops is not usually marked by deficient rainfall, but the latter end of the spring is apt to partake of the character of summer, and it is the abrupt change that militates against the success of growth stimulants like sulphate of ammonia and nitrate of soda. The danger is that crops dressed with these fertilisers may make more vegetative growth than the reserves of soil moisture can adequately supply during the later stages of development, and consequently such manures do not generally have favorable opportunity of producing their full effects on the crops throughout the whole period of development. It was with the idea of learning to what extent a less active form of nitrogen would overcome this disability that sulphate of ammonia plots were instituted in 1911. The results obtained are given below:—

TABLE XXX.—*Showing Results from Wheat Dressed with 2cwts. Superphosphate and ½cwt. of Sulphate of Ammonia; and also Wheat Dressed with 2cwts. Superphosphate and ½cwt. Nitrate of Soda, Comparatively with Wheat Dressed with 2cwts. Superphosphate alone*, 1911-15.

| Years. | GRAIN YIELDS. | | | | | | TOTAL PRODUCE YIELDS. | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2cwts. Superphosphate. | | 2cwts. Superphosphate and ½cwt. of Nitrate of Soda. | | 2cwts. Superphosphate and ½cwt. of Sulphate of Ammonia. | | 2cwts. Superphosphate. | | | 2cwts. Superphosphate and ½cwt. of Nitrate of Soda. | | | 2cwts. Superphosphate and ½cwt. of Sulphate of Ammonia. | | |
| | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. | T. | C. | L. | T. | C. | L. | T. | C. | L. |
| 1911 .......... | 17 | 32 | — | | 17 | 50 | 1 | 13 | 12 | — | | | 1 | 14 | 9 |
| 1912 .......... | 19 | 5 | 21 | 58 | 27 | 17 | 1 | 8 | 45 | 1 | 12 | 93 | 2 | 0 | 99 |
| 1913 .......... | 8 | 35 | 9 | 28 | 6 | 7 | 0 | 16 | 85 | 0 | 17 | 28 | 0 | 12 | 23 |
| 1914 .......... | 16 | 47 | 15 | 44 | 12 | 58 | 1 | 4 | 76 | 1 | 1 | 20 | 0 | 18 | 67 |
| 1915 .......... | 22 | 56 | 21 | 49 | 26 | 45 | 2 | 2 | 12 | 2 | 18 | 37 | 2 | 10 | 85 |
| Means.......... | 16 | 59 | 17 | 15 | 18 | 11 | 1 | 9 | 1 | 1 | 12 | 44 | 1 | 11 | 34 |
| Mean—Hay equivalent ... | — | | — | | — | | 1 | 15 | 42 | 1 | 19 | 56 | 1 | 18 | 20 |

TABLE XXXI.—*Yields Compared.*

GRAIN YIELDS.

| Manure. | INCREASE OVER OR DECREASE BELOW. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2cwts. Superphosphate. | | | | | | 2cwts. Superphosphate and ½cwt. Nitrate of Soda. | | | | | |
| | Difference in Yield. | | Gross Value. | | Net Value. | | Difference in Yield. | | Gross Value. | | Net Value. | |
| | Bsh. | lbs. | *s.* | *d.* | *s.* | *d.* | Bsh. | lbs. | *s.* | *d.* | *s.* | *d.* |
| 2cwts. superphosphate and ½cwt. nitrate of soda .............. | 0 | 24 | 1 | 5 | -5 | 7 | — | | — | | — | |
| 2cwts. superphosphate and ½cwt. sulphate of ammonia ......... | 1 | 12 | 4 | 2 | 2 | 10 | 1 | 2 | 3 | 7 | 3 | 7 |

TABLE XXXI.—*Yields Compared*—continued.

HAY YIELDS.

| Manure. | INCREASE OVER OR DECREASE BELOW. | | | | | |
|---|---|---|---|---|---|---|
| | 2cwts. Superphosphate. | | | 2cwts. Superphosphate and ½cwt. Nitrate of Soda. | | |
| | Difference in Yield. | Gross Value. | Net Value. | Difference in Yield. | Gross Value. | Net Value. |
| | C. L. | *s. d.* | *s. d.* | C. L. | *s. d.* | *s. d.* |
| 2cwts. superphosphate and ½cwt. nitrate of soda | 5 42 | 9 5 | 2 5 | — | — | — |
| 2cwts. superphosphate and ½cwt. sulphate of ammonia | 2 90 | 4 11 | –2 1 | –2 20 | –3 10 | –3 10 |

These tables enable us to see that up to the present sulphate of ammonia has not made good as a wheat fertiliser in this district. On grain crops its use has given an increased return of 1bush. 12lbs., but after allowing for the cost of the manure at the rate of £14 per ton, the net result is a loss of 2s. 10d. per acre, as compared with the check plot. Similarly the hay yield was increased, but at a cost of 2s. 1d. per acre.

If we consult the figures given in the latter of these two tables, we will be able to compare sulphate of ammonia with nitrate of soda. It is true that the mean results cover a relatively short period, but nevertheless it is interesting to learn that in the case of grain crops the slower-acting form of nitrogen is slightly the better, whereas for hay crops the nitrate nitrogen has the advantage.

In concluding our remarks on the role of nitrogenous manures on clay loams, we would say that, so far as our observations have gone, there is no sound reason for believing that they may be profitably employed on wheat crops grown for hay or grain in this district.

### 3. POTASSIC MANURES.

Except in some of the light mallee districts, where enterprising settlers have occasionally tested potassic manures in a rough and ready manner, and thereby had their fixed ideas as to the inutility of potash as a fertiliser for cereals in South Australia rudely shaken, there exists in the minds of most farmers a firmly rooted conviction that potash in any form is "bad buying" for wheatgrowers under local conditions. In so far as this belief applies to our northern wheat areas, it appears to be well founded, although the results now being obtained from our Permanent Test Plots are not consistent with the view that potassic fertilisers are without effect on the wheat yield. The series of plots bearing on this question were initiated in 1911, so that the mean figures represent the average returns for five successive seasons.

TABLE XXXII.—*Showing Results from Wheat Treated with Potassic Manures, Comparatively with the Means of Two Adjoining Superphosphate Plots and of Two No Manure Plots,* 1911-15.

GRAIN YIELDS.

| Years. | Means of Two No-Manure Plots. | | Means of Two 2cwt. Superphosphate Plots. | | ½cwt. Sulphate of Potash. | | 2cwts. Superphosphate and ½cwt. Sulphate of Potash. | | 2cwts. Superphosphate and ½cwt. Muriate of Potash. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. |
| 1911 ........... | 9 | 0 | 14 | 38 | 18 | 24 | 23 | 22 | 22 | 17 |
| 1912 ........... | 10 | 43 | 19 | 50 | 17 | 32 | 23 | 49 | 25 | 6 |
| 1913 ........... | 2 | 39 | 7 | 32 | 4 | 25 | 6 | 52 | 6 | 0 |
| 1914 ........... | 6 | 17 | 11 | 34 | 5 | 3 | 7 | 53 | 11 | 52 |
| 1915 ........... | 21 | 35 | 25 | 49 | 27 | 32 | 28 | 48 | 28 | 3 |
| Means .......... | 10 | 3 | 15 | 53 | 14 | 35 | 18 | 9 | 18 | 40 |

TOTAL PRODUCE YIELDS.

| Years. | Means of Two No-Manure Plots. | | | Means of Two 2cwt. Superphosphate Plots. | | | ½cwt. Sulphate of Potash. | | | 2cwts. Superphosphate and ½cwt. Sulphate of Potash. | | | 2cwts. Superphosphate and ½cwt. Muriate of Potash. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | T. | C. | L. | T. | C. | L. | T. | C. | L. | T. | C. | L. | T. | C. | L. |
| 1911 ......... | 1 | 0 | 34 | 1 | 9 | 29 | 1 | 11 | 28 | 1 | 17 | 104 | 1 | 19 | 2 |
| 1912 ......... | 0 | 17 | 63 | 1 | 9 | 64 | 1 | 7 | 8 | 1 | 14 | 73 | 1 | 17 | 15 |
| 1913 ......... | 0 | 7 | 79 | 0 | 14 | 90 | 0 | 10 | 45 | 0 | 11 | 94 | 0 | 12 | 63 |
| 1914 ......... | 0 | 10 | 75 | 0 | 16 | 69 | 0 | 7 | 1 | 0 | 9 | 89 | 0 | 14 | 86 |
| 1915 ......... | 1 | 18 | 68 | 2 | 4 | 71 | 2 | 9 | 38 | 2 | 8 | 45 | 2 | 11 | 14 |
| Means ........ | 0 | 18 | 109 | 1 | 6 | 109 | 1 | 5 | 6 | 1 | 8 | 57 | 1 | 10 | 103 |
| Means hay equivalent .. | 1 | 3 | 15 | 1 | 12 | 100 | 1 | 10 | 62 | 1 | 14 | 86 | 1 | 17 | 79 |

TABLE XXXIII.—*Grain Yields Compared.*

| Manure. | Mean Yield. | | INCREASE OVER OR DECREASE BELOW. No Manure. Diffce. in Yield. | | Gross Value. | | Net Value. | | 2cwts. Superphosphate. Diffce. in Yield. | | Gross Value. | | Net Value. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bsh. | lbs. | Bsh. | lbs. | *s.* | *d.* | *s.* | *d.* | Bsh. | lbs. | *s.* | *d.* | *s.* | *d.* |
| No manure .................. | 10 | 3 | — | | — | | — | | — | | — | | — | |
| 2cwt. superphosphate .......... | 15 | 53 | 5 | 50 | 20 | 5 | 11 | 5 | — | | — | | — | |
| ½cwt. sulphate of potash ...... | 14 | 35 | 4 | 32 | 15 | 10 | 8 | 10 | 1 | 18 | 4 | 7 | 2 | 7 |
| 2cwts. superphosphate and ½cwt. sulphate of potash .......... | 18 | 9 | 8 | 6 | 28 | 4 | 12 | 4 | 2 | 16 | 7 | 11 | 0 | 11 |
| 2cwts. superphosphate and ½cwt. muriate potash ............ | 18 | 40 | 8 | 37 | 30 | 2 | 14 | 2 | 2 | 47 | 9 | 9 | 2 | 9 |

| Mauure. | Mean Yield. | | INCREASE OVER OR DECREASE BELOW. ½cwt. Sulphate of Potash. Diffce. in Yield. | | Gross Value. | | Net Value. | | 2cwts. Superphosphate and ½cwt. Sulphate of Potash. Diffce. in Yield. | | Gross Value. | | Net Value. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bsh. | lbs. | Bsh. | lbs. | *s.* | *d.* | *s.* | *d.* | Bsh. | lbs. | *s.* | *d.* | *s.* | *d.* |
| No manure .................. | 10 | 3 | — | | — | | — | | — | | — | | — | |
| 2cwts. superphosphate ........ | 15 | 53 | — | | — | | — | | — | | — | | — | |
| ½cwt. sulphate of potash ...... | 14 | 35 | — | | — | | — | | — | | — | | — | |
| 2cwts. superphosphate and ½cwt. sulphate of potash .......... | 18 | 9 | 3 | 34 | 12 | 6 | 3 | 6 | — | | — | | — | |
| 2cwts. superphosphate and ½cwt. muriate potash ............ | 18 | 40 | 4 | 5 | 14 | 3 | 5 | 3 | 0 | 31 | 1 | 10 | 1 | 10 |

TABLE XXXIV.—*Hay Equivalents Compared.*

| Manure. | Mean Yield. | | | INCREASE OVER OR DECREASE BELOW. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | No Manure. | | | | | | 2cwts. Superphosphate and ½cwt. Sulphate of Potash- | | | | | |
| | | | | Diffce. in Yield. | | Gross Value. | | Net Value. | | Diffce. in Yield. | | Gross Value. | | Net Value. | |
| | T. | C. | L. | C. | L. | *s.* | *d.* | *s.* | *d.* | C. | L. | *s.* | *d.* | *s.* | *d.* |
| No manure | 1 | 3 | 15 | — | | — | | — | | — | | — | | — | |
| 2cwts. superphosphate | 1 | 12 | 100 | 9 | 85 | 17 | 1 | 8 | 1 | — | | — | | — | |
| ½cwt. sulphate potash | 1 | 10 | 62 | 7 | 47 | 13 | 0 | 6 | 0 | 2 | 38 | –4 | 1 | –2 | 1 |
| 2cwts. superphosphate and ½cwt. sulphate potash | 1 | 14 | 86 | 11 | 71 | 20 | 4 | 4 | 4 | 1 | 98 | 3 | 3 | –3 | 9 |
| 2cwts. superphosphate and ½cwt. muriate of potash | 1 | 17 | 79 | 14 | 64 | 25 | 6 | 9 | 6 | 4 | 91 | 8 | 5 | 1 | 5 |

| Manure. | Mean Yield. | | | INCREASE OVER OR DECREASE BELOW. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | ½cwt. Sulphate of Potash. | | | | | | 2cwts. Superphosphate and ½cwt. Sulphate of Potash. | | | | | |
| | | | | Diffce. in Yield. | | Gross Value. | | Net Value. | | Diffce. in Yield. | | Gross Value. | | Net Value. | |
| | T. | C. | L. | C. | L. | *s.* | *d.* | *s.* | *d.* | C. | L. | *s.* | *d.* | *s.* | *d.* |
| No manure | 1 | 3 | 15 | — | | — | | — | | — | | — | | — | |
| 2cwts. superphosphate | 1 | 12 | 100 | — | | — | | — | | — | | — | | — | |
| ½cwt. sulphate potash | 1 | 10 | 62 | — | | — | | — | | — | | — | | — | |
| 2cwts. superphosphate and ½cwt. sulphate potash | 1 | 14 | 86 | 4 | 24 | 7 | 4 | –1 | 8 | — | | — | | — | |
| 2cwts. superphosphate and ½cwt. muriate of potash | 1 | 17 | 79 | 7 | 17 | 12 | 6 | 3 | 6 | 2 | 105 | 5 | 2 | 5 | 2 |

### (*a*) SULPHATE OF POTASH.

In the first place, we would direct attention to the high returns derived from the plot receiving ½cwt. sulphate of potash in comparison with the mean yields of the two unmanured plots. The explanation is not far to seek. During the five-year period—1905-1909—the former was cropped with wheat four times, and on each occasion was dressed with 2cwts. of standard superphosphate and ½cwt. or 1cwt. of nitrate of soda per acre. This will no doubt influence the results for the first few seasons, but it is already evident that the effects are wearing off, as the mean difference is now 4bush. 32lbs., whereas in 1913 it was within a pound of 6bush. per acre. In total produce there is also a reduction, though the accumulated manurial residues appear to be more lasting in their effects on vegetative growth than on grain production.

We have next to contrast the figures for the ½cwt. of sulphate of potash plots with those given for wheat manured with 2cwt. of superphosphate in conjunction with a similar potassic dressing. In grain, the latter has yielded on the average an extra 3bush. 34lbs. per acre, which works out at 3s. 6d. per acre additional profit after allowing for the cost of the superphosphate. With regard to hay yields, however, the position is reversed, and it will be noticed that in Table XXXIV. there is shown a balance of 1s. 8d. per acre to the credit of the plot receiving potash alone. This reversal of the order is contrary to the usual experience, and we can only surmise that the manure applied prior to 1911 is still influencing plant growth in a measurable degree.

If this were not so, we should be forced to admit that the mean yields from these two plots indicate that sulphate of potash alone is at least as serviceable as superphosphate plus sulphate of potash as a manure for hay crops under our conditions. Yet we see that both in grain and total produce 2cwts. of superphosphate have given a net return of over 2s. an acre more than the ½cwt. of sulphate of potash.

### (*b*) MURIATE OF POTASH.

Now let us consider the form in which potash may be applied to the best advantage. The two chief sources of potash on the market are the sulphate and the muriate, and little if anything is definitely known as to their relative manurial values. The "potash" plots in No. 4 have been arranged to throw light on this question, and it will be observed that in the foregoing tables the muriate has come out ahead of the sulphate to the extent of 31lbs. of grain or 2cwt. 105lbs. of hay per acre per annum. The net values of these differences are 1s. 10d. and 5s. 2d. respectively. In every one of the five years the hay return has been appreciably heavier from the muriate plot, and it therefore seems probable that, in the future, it will be found that potassic manuring is a profit-bearing practice in this district. It is in the form of a muriate dressing that potash will first make its appearance on the farms. We shall be in a better position to discuss these comparisons when the experiments have extended over a longer period, and in the meantime we consider that no useful purpose would be served by basing conclusions on the available data.

## 4. FARMYARD MANURE.

This is the only complete fertiliser that has been subjected to trial at the College. It is very variable in composition and relatively poor in the elements of fertility. Roughly speaking, it contains equal amounts of nitrogen and potash, whilst the phosphoric acid present is approximately 50 per cent. less. First-class farmyard manure, manufactured under favorable conditions and good management, will contain up to 15lbs. of nitrogen, 15lbs. of potash, and 9lbs. of phosphoric acid per ton; but where the manure is derived from stock fed on a less sumptuous scale, and when the manure stack is exposed to the hot dry summers of this locality, the composition will doubtless fall much below these figures. We should probably err on the safe side if we assumed the manure with which we have to work in these experiments to contain 10lbs. each of nitrogen and potash and 5lbs. of phosphoric acid in a ton. Calculating on these figures, the total amounts of these elements of fertility applied to the land in a 14-ton per acre dressing work out to be 1¼cwt. each of nitrogen and potash and 70lbs. or ⅝ (five-eighths) of a cwt. of phosphoric acid.

Thus we see that whilst farmyard manure is in itself relatively poor in plant food, yet by reason of the large quantities applied it becomes a carrier of unusually large amounts of the chief elements of fertility. Thus in a 2cwt. dressing of superphosphate we bring to the soil from 40lbs. to 50lbs. of phosphoric acid, whereas 14 tons of farmyard manure contain at least 70lbs. of the same ingredient. Similarly, 1cwt. of nitrate of soda conveys 16lbs. to 17lbs. of nitrogen to the land, and 14 tons of dung 140lbs.; again, 1cwt. of sulphate of potash contains approximately 56lbs. of potash, as against 170lbs. at a low estimate in farmyard manure. It should be stated, however, that the fertilising ingredients of farmyard manure are in a high state of dilution, and many complex changes must take place before the food elements incorporated in it can be released in a suitable condition for assimilation by growing plants. It is rather as a soil-restorer than a plant stimulant that we must regard this bulky manure. Additionally, we have to consider the mechanical effects of the fibrous organic matter which constitutes its mass. The typical wheat soils at Roseworthy are sticky and heavy to work, a condition that points to the need for replenishing the stores of humus in the land, and we may expect to find ultimately that the ameliorating influence of farmyard manure on the physical texture of our soils will influence in no small degree their fertility or "condition."

The arrangement of dunged plots included in the permanent experiments, together with the results obtained up to 1915, are appended.

TABLE XXXV.—*Showing Results from Wheat Dressed with* 14 *tons of Farmyard Manures, Comparatively with Wheat Dressed with* 2*cwts. Superphosphate and with Unmanured Wheat,* 1906-15.

| | GRAIN YIELDS. | | | | | | TOTAL PRODUCE YIELDS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Years. | No Manure. | | 2cwts. Super-phosphate. | | 14 Tons Farmyard Manure. | | No Manure. | | | 2cwts. Super-phosphate. | | | 14 Tons Farmyard Manure. | | |
| | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. | T. | C. | L. | T. | C. | L. | T. | C. | L. |
| 1906 ....... | 15 | 57 | 20 | 49 | 16 | 4 | 2 | 0 | 91 | 2 | 11 | 60 | 1 | 19 | 50 |
| 1907 ....... | 13 | 21 | 14 | 58 | 14 | 31 | 0 | 18 | 17 | 0 | 19 | 13 | 1 | 1 | 6 |
| 1908 ....... | 24 | 33 | 38 | 20 | 23 | 17 | 2 | 0 | 96 | 3 | 1 | 111 | 2 | 0 | 80 |
| 1909 ....... | 26 | 2 | 31 | 2 | 33 | 23 | 2 | 6 | 97 | 2 | 15 | 66 | 2 | 16 | 85 |
| 1910 ....... | 18 | 29 | 19 | 11 | 24 | 2 | 1 | 18 | 9 | 2 | 3 | 76 | 2 | 10 | 83 |
| 1911 ....... | 5 | 39 | 17 | 32 | 19 | 11 | 0 | 13 | 20 | 1 | 13 | 12 | 1 | 17 | 96 |
| 1912 ....... | 9 | 25 | 19 | 5 | 16 | 11 | 0 | 17 | 83 | 1 | 8 | 45 | 1 | 6 | 32 |
| 1913 ....... | 2 | 41 | 8 | 35 | 4 | 43 | 0 | 9 | 44 | 0 | 16 | 85 | 0 | 15 | 30 |
| 1914 ....... | 8 | 39 | 16 | 47 | 10 | 50 | 0 | 14 | 46 | 1 | 4 | 76 | 0 | 16 | 83 |
| 1915 ....... | 19 | 51 | 22 | 56 | 19 | 32 | 1 | 16 | 30 | 2 | 2 | 12 | 2 | 6 | 107 |
| Means ...... | 14 | 28 | 20 | 55 | 18 | 10 | 1 | 7 | 64 | 1 | 17 | 56 | 1 | 15 | 20 |

TABLE XXXVI.—*Showing Comparative Results from Wheat Dressed with Farmyard Manure alone, with Farmyard and Artificial Manures, and with Superphosphate alone*, 1912-15.

GRAIN YIELDS.

| Years. | 2cwts. Superphosphate. | | 14 Tons Farmyard Manure. | | 14 Tons Farmyard Manure and 2cwts. Superphosphate. | | 14 Tons Farmyard Manure and 2cwts. Superphosphate and ½cwt. Sulphate of Potash. | |
|---|---|---|---|---|---|---|---|---|
| | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. |
| 1912 ................ | 19 | 5 | 16 | 11 | 24 | 13 | 25 | 26 |
| 1913 ................ | 8 | 35 | 4 | 43 | 8 | 19 | 10 | 9 |
| 1914 ................ | 16 | 47 | 10 | 50 | 16 | 7 | 14 | 51 |
| 1915 ................ | 22 | 56 | 19 | 32 | 24 | 0 | 22 | 0 |
| Mean—Hay equivalent.. | 16 | 51 | 12 | 49 | 18 | 10 | 18 | 6 |

TOTAL PRODUCE YIELDS.

| Years. | 2cwts. Superphosphate. | | | 14 Tons Farmyard Manure. | | | 14 Tons Farmyard Manure and 2cwts. Superphosphate. | | | 14 Tons Farmyard Manure and 2cwts. Superphosphate and ½cwt. Sulphate of Potash. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | T. | C. | L. | T. | C. | L. | T. | C. | L. | T. | C. | L. |
| 1912 ............... | 1 | 8 | 45 | 1 | 6 | 32 | 1 | 18 | 16 | 1 | 19 | 98 |
| 1913 ............... | 0 | 16 | 85 | 0 | 15 | 30 | 0 | 18 | 83 | 0 | 19 | 1 |
| 1914 ............... | 1 | 4 | 76 | 0 | 16 | 83 | 1 | 2 | 5 | 1 | 1 | 105 |
| 1915 ............... | 2 | 2 | 12 | 2 | 6 | 107 | 2 | 18 | 36 | 2 | 12 | 46 |
| Means .............. | 1 | 7 | 110 | 1 | 6 | 35 | 1 | 14 | 35 | 1 | 13 | 34 |
| Mean—Hay equivalent | 1 | 14 | 14 | 1 | 12 | 10 | 2 | 1 | 95 | 2 | 0 | 69 |

TABLE XXXVII.—*Showing Comparative Values.*

GRAIN YIELDS.

| Manure. | 2cwts. Superphosphate per Acre. | | | | | | | 14 Tons Farmyard Manure per Acre. | | | | | | 2cwts. Superphosphate and 14 Tons Farmyard Manure per Acre. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Diffce. in Yield. | | Gross Value. | | Net Value. | | | Diffce. in Yield. | | Gross Value. | | Net Value. | | Diffce. in Yield. | | Gross Value. | | Net Value. | |
| | B. | L. | *s.* | *d.* | £ | *s.* | *d.* | B. | L. | *s.* | *d.* | *s.* | *d.* | B. | L. | *s.* | *d.* | *s.* | *d.* |
| 14 tons farmyard manure per acre ............ | -4 | 2 | -14 | 1 | -3 | 15 | 1 | — | | — | | — | | — | | — | | — | |
| 14 tons farmyard manure and 2cwts. superphosphate per acre ........ | 1 | 19 | 4 | 7 | -3 | 5 | 5 | 5 | 21 | 18 | 9 | 9 | 9 | — | | — | | — | |
| 14 tons farmyard manure, 2cwts. superphosphate, and ½cwt. sulphate of potash per acre........ | 1 | 15 | 4 | 4 | -3 | 12 | 8 | 5 | 17 | 18 | 6 | 2 | 6 | -0 | 4 | -0 | 3 | -7 | 3 |

HAY YIELDS.

| Manure. | C. | L. | *s.* | *d.* | £ | *s.* | *d.* | C. | L. | *s.* | *d.* | *s.* | *d.* | C. | L. | *s.* | *d.* | *s.* | *d.* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 tons farmyard manure per acre ............ | -2 | 4 | -3 | 7 | -3 | 4 | 7 | — | | — | | — | | — | | — | | — | |
| 14 tons farmyard manure and 2cwts. superphosphate per acre ........ | 7 | 81 | 13 | 6 | -2 | 16 | 6 | 9 | 85 | 17 | 1 | 8 | 1 | — | | — | | — | |
| 14 tons farmyard manure, 2cwts. superphosphate, and ½cwt. sulphate of potash per acre........ | 6 | 55 | 11 | 4 | -3 | 5 | 8 | 8 | 59 | 14 | 11 | -1 | 1 | -1 | 26 | -2 | 2 | -9 | 2 |

It is clear from the above figures that up to the present the dosing of our soils with lime does not appear to be a paying proposition. It will be noted that in 1912 and 1913 the results were markedly in favor of the limed plots, whereas with the exception of the total produce returns in 1915, the yields during the last two seasons have been higher on the unlimed plot. The drought of 1914 would not tend to assist the crop on the limed soil, and, moreover, it should be pointed out that the check plot receiving superphosphate only has been in receipt of 2cwt. per acre every alternate year since 1905, whereas the limed plot was only brought in under a regular system of manuring as late as 1912. The value of the comparison in yields obtained in 1915 is vitiated in some measure by the disastrous effects of red rust. The disease appeared particularly rife in the crops growing at the western extremity of Field No. 4, and the limed plot suffered much more severely than did the check plot cited in the above table. Turning to the mean figures for the period 1912-1915, there is found to be an average increase of 32lbs. of grain or 4cwt. 2lbs. of hay as the result of liming; but when due allowance—1s. 9d. per cwt.—is made for the extra expense entailed, the practice is found to result in a net loss of 6s. 11d. per acre with grain crops, and 1s. 9d. per acre with hay crops.

In connection with lime, however, it must be realised that the cumulative effects will be seen in the amelioration of the soil, leading to easier and less costly tillage, and it remains to be seen whether in the course of time the benefits accruing from the use of calcareous dressings will not show up to greater advantage than they have done hitherto. At the present stage of the investigation, it would be misleading to frame definite conclusions on the virtues of lime as a soil amendment in this district.

## SUMMARY OF MANURIAL EXPERIMENTS.

It will have been noticed that the foregoing manurial experiments do not all extend over the same series of seasons. At the present stage it is not possible to reduce them all to the same basis in this respect without sacrificing some of the most valuable data; but in the final table appended the plots have been grouped into three series, namely, the 1906-1915, 1910-1915, and 1912-1915 experiments, and the net cash values of the mean returns have been given for grain or calculated hay yields.

TABLE XXXIX.—*Summarising Direct Effects of Various Fertilisers on Wheat, as Indicated by Net Values of Mean Yields of Grain or Hay after Deducting Cost of Manure.*

(*a*) BARE FALLOW—WHEAT ROTATION.

| Period. | Manure. | Net Value of Mean Yields. Grain. £ | s. | d. | Hay. £ | s. | d. |
|---|---|---|---|---|---|---|---|
| 1906-15. | No manure | 2 | 12 | 6 | 2 | 17 | 5 |
| | ½cwt. superphosphate | 3 | 3 | 4 | 3 | 9 | 1 |
| | 2cwts. superphosphate | 3 | 2 | 3 | 3 | 8 | 2 |
| | 2cwts. basic slag | 2 | 14 | 1 | 3 | 2 | 2 |
| | 3cwts. basic slag | 2 | 15 | 7 | 2 | 18 | 9 |
| | 2cwts. superphosphate and 1cwt. nitrate of soda (spring sown) | 2 | 13 | 7 | 2 | 4 | 10 |
| | 2cwts. superphosphate and 1cwt. nitrate of soda (autumn sown) | 2 | 14 | 1 | 2 | 4 | 2 |
| | 2cwts. superphosphate and ½cwt. nitrate soda | 2 | 19 | 7 | 3 | 4 | 2 |
| 1912-15 | 2cwts. superphosphate | 2 | 7 | 8 | 2 | 16 | 4 |
| | 2cwts. superphosphate and ½cwt. nitrate of soda | 2 | 4 | 4 | 2 | 13 | 1 |
| | 3cwts. superphosphate and 1cwt. nitrate of soda | 1 | 18 | 7 | 2 | 5 | 3 |
| | 2cwts. superphosphate and ½cwt. sulphate of ammonia | 2 | 8 | 0 | 2 | 9 | 4 |
| | ½cwt. sulphate of potash | 2 | 0 | 9 | 2 | 3 | 1 |
| | 2cwts. superphosphate and ½cwt. sulphate of potash | 2 | 2 | 11 | 1 | 19 | 10 |
| | 2cwts. superphosphate and ½cwt. muriate of potash | 2 | 6 | 1 | 2 | 5 | 8 |
| | 5cwts. lime and 2cwts. of superphosphate | 2 | 3 | 1 | 2 | 9 | 0 |
| | 14 tons. farmyard manure | 1 | 5 | 2 – Loss | 0 | 13 | 10 – Loss |
| | 2cwts. superphosphate and 14 tons farmyard manure | 0 | 15 | 5 – Loss | 0 | 5 | 9 – Loss |
| | 2cwts. superphosphate, 14 tons farmyard manure, and ½cwt. sulphate of potash | 1 | 2 | 8 – Loss | 0 | 14 | 11 – Loss |

(*b*) BARE FALLOW—WHEAT—PASTURE ROTATION.

| Period. | Manure. | Net Value of Mean Yields. Grain. £ | s. | d. | Hay. £ | s. | d. |
|---|---|---|---|---|---|---|---|
| 1910-15 | No manure | 1 | 6 | 11 | 1 | 12 | 11 |
| | ½cwt. superphosphate | 2 | 6 | 1 | 2 | 7 | 5 |
| | 1cwt. superphosphate | 2 | 5 | 11 | 2 | 14 | 8 |
| | 2cwts. superphosphate | 2 | 0 | 10 | 2 | 10 | 11 |
| | 3cwts. superphosphate | 1 | 16 | 0 | 2 | 6 | 10 |

(*To be continued.*)

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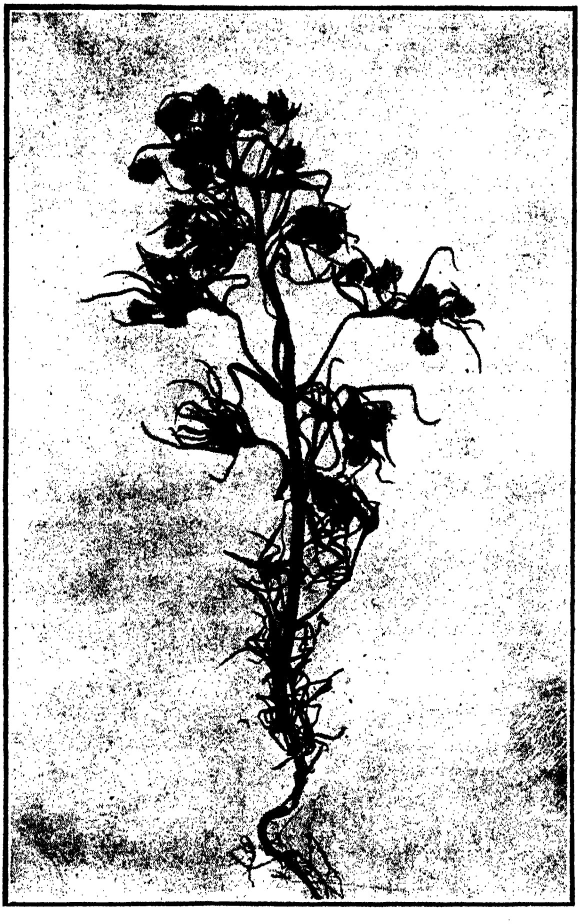
## MANURIAL VALUE OF BONES.

As to the relative manurial values of crushed bones and burned bones, the Director of Agriculture says much depends on the extent to which the bones are burnt; if merely charred, beyond the destruction of a little organic matter there will be little difference. If the bones are roasted to the extent of supplying on grinding what is known as animal charcoal all the organic matter will have been destroyed, but the tricalcium phosphate will be appreciably more soluble.

# "THE FLEA-SEED."—A NEW WEED PLANT.

[By Professor T. G. B. Osborn, M.Sc.]

One of the most recent additions to the alien weed flora of this State is *Plantago Psyllium L.* This plant was sent to the Department of Agriculture for identification by the Agricultural Bureau of Nantawarra at the end of October, together with the information that it was spreading rapidly in the district. Since it is likely that the plant will continue to spread, particularly in sandy districts, unless precautionary measures are taken, a short description is here given, so that farmers may be on the watch for its first appearance, and check it before it becomes a serious nuisance.



The specimens of *Plantago Psyllium* submitted to the department are tough herbaceous plants 6in. to 8in. in height. They have usually a single upright stem bearing opposite pairs of narrow pointed leaves. In connection with each leaf there is usually found, particularly at the upper end, a side shoot which may branch again, so that the growth is rather bushy. The whole plant is somewhat sticky with glandular hairs. The flowers are produced in little spherical to egg-shaped clusters, ¼in. to ½in. long, at the ends of slender stalks that may be fully an inch in length. Each flower cluster is really a short spike consisting of a dozen or so flowers. The individual flower is inconspicuous. The petals are joined into a tube, which ends in a four-pointed star; they are chaffy and of a pale-yellow color. The seeds are small, flattened, oval, brown bodies; fortunately they have no special method for ensuring rapid dispersal, for 800 to 1,000 seeds is a moderate computation for each plant.

*Plantago Psyllium* is a native of the Mediterranean coasts, spreading north into Austria and east as far as Persia. It is a member of the same family as the ribgrass (*Plantago lanceolata*), but is not at all like that plant in appearance. At a casual glance it rather resembles a plant of "stinkwort" (*Inula graviolens*). A careful look at the flowers, however, shows that there is no relationship whatever to the stinkwort family. The flowers are very similar to those of the ribgrass, in spite of the differing habits of the plants.

The specific name *Psyllium* comes from a Greek word meaning "a flea;" this idea is also expressed in the common German name *Flohsamen* ("flea-seed"). Presumably the brown seeds have some fancied resemblance to that insect. Unlike many of our alien plants, the flea-seed is not without some commercial value. The seeds are rich in a mucilage, and when soaked in water give a gummy extract. This gum is used in parts of Europe and the Orient for imparting a "finish" to textiles and for stiffening muslin. The seeds are also used medicinally; they occur in the Pharmacopœia as *semen psyllii*, and their gummy extract is used as a soothing lotion in cases of inflammatory ophthalmia. Baron von Mueller, in his "Select Extra-Tropical Plants," suggested that the flea-seed is suitable for naturalisation along sandy coast lands, but I am not aware that any attempt has been made to do so in Australia. In fact, the record of this plant by the Nantawarra Agricultural Bureau is the first notice of its occurrence in Australia. The trouble with such a plant is that it is exceedingly unlikely to confine its attention to waste coast lands, but will probably spread over much of our light sandy country, to the detriment of useful fodder plants. At present it appears to be most abundant on a four-acre patch some 16 miles from Port Wakefield, on the Lochiel main road. There are, however, other small areas affected in the district. How it can have got there is not easy to see. Probably it was introduced into the State in ballast, and may have spread up from the coast.

In spite of the fact that in certain parts of the world the seeds have some commercial value, I am informed by the managing director of one of the largest drug houses that it is very unlikely that any use could be made of them in Australia. Since the plant appears to be at the height of its growth in October, it is merely cumbering the ground, choking out valuable plants and robbing the soil. It is, therefore strongly recommended that the plant be destroyed wherever found. Since it is an annual, this should be fairly easy if it be taken in time. Any methods of cultivation that will prevent seeding should be effective, and all farmers who have the interest of their land at heart are urged to do their best to stamp out this most recent "undesirable immigrant."

## PLEURO-PNEUMONIA AND TUBERCULOSIS.

A correspondent, writing from Wilcannia, seeks assistance in determining whether an animal is affected with pleuro-pneumonia or tuberculosis, (a) *ante mortem,* and (b) *post mortem.* In reply, the Government Veterinary Lecturer (Mr. Place) has set out the differences briefly, as follows:—

### Ante Mortem Differences.

| *Pleuro.* | *Tuberculosis.* |
|---|---|
| Onset more or less quick. | Onset slow. |
| Head poked and drooping, shallow, painful breathing. | Head carried straight out when glands are affected. |
| Death after a few days in acute cases. | Pining and slow death. |
| Slow recovery. | Steady progress from bad to worse, often slow. |
| Grunting when struck. | Cough when hurried. |
| Bowels more or less normal. | Acute diarrhœa in advanced cases. |
| Eyes sunken. | Eye often too bright. |
| Signs of fever, such as dry nose, fevered eye, salivation, and shoulders humped. | Gradual loss of flesh, swelling of glands of throat, stiffness. |

### Post Mortem Differences.

| *Pleuro.* | *Tuberculosis.* |
|---|---|
| Lungs markedly inflamed, thickened, and "marbled," *i.e.,* tissue thick between lobules. Much straw-colored fluid in lungs and pockets of it in fibrous thickening between lungs and ribs and in chest; other organs not much disturbed. | All organs liable to attack. Tubercles varying in size from pin's head to potato in substance of lungs, on lining of chest and belly, breaking down into abscesses, or cheesy or gritty like gravel. |
| Glands not enlarged; lungs much enlarged. | Glands (kernels) nearly always much enlarged, lungs not so. |
| Dark, hard areas. | Tubercles not hard areas. Glands of bowels, liver, spleen, etc., often all involved. |

# POISON HEMLOCK.

## (*CONIUM MACULATUM, L.*)

### A DEADLY PLANT.

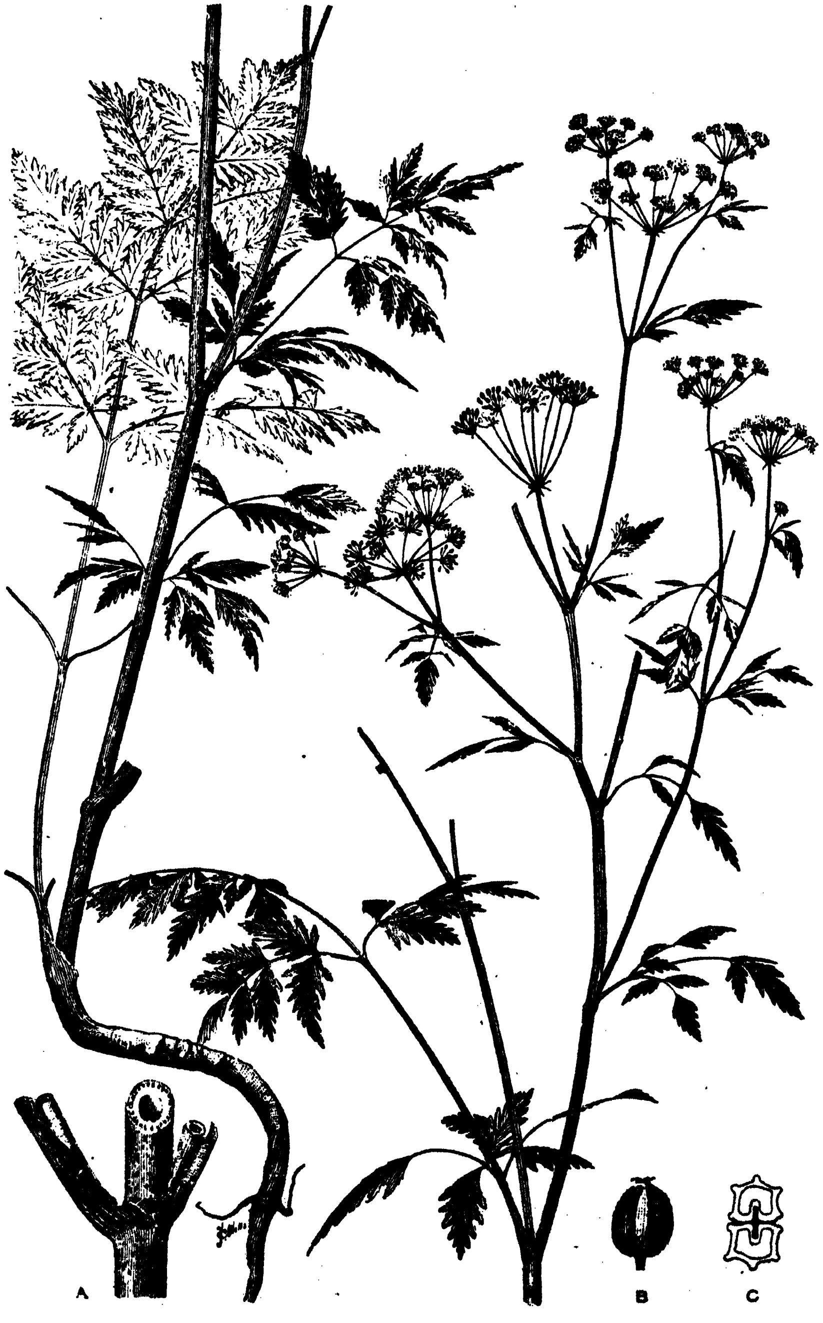
[By H. W. ANDREW, Botanical Assistant and Quarantine Officer for Plants, South Australia.]

This plant is a proclaimed weed pest under the Federal Quarantine Act, and plants or seeds of it are absolutely prohibited from entering the Commonwealth. It is also proclaimed noxious for the State of Victoria. Hitherto it has not been recorded as growing wild in this State, although the "Naturalised Flora of South Australia" states that Dr. R. S. Rogers found it growing wild in Neptune Island in January, 1907. Recently, at Kapunda, the writer found specimens growing in a number of vacant allotments in and around the township—evidently established as a garden escape—the plant being quite commonly grown in the gardens of the township. Some of these were vigorous specimens, over 5ft. in height, the showy umbels of flowers and pretty fern-like leaves making a rather handsome plant, which latter goes to explain its cultivation under the name of the Carrot or Parsley Fern. In Victoria, too, it is regarded as a common garden escape, although its seeds are occasionally found mixed with other commercial seeds as an impurity. Besides these plants at Kapunda the writer, while collecting weed seeds some time previously along the Torrens River, found patches of the weed along the northern bank near Morphett Street and Hackney Road bridges.

### HEMLOCK AS A POISON PLANT.

Mr. J. H. Maiden, the Government Botanist of New South Wales, in "Some Observations of Weeds," published in the *Government Agricultural Gazette* of New South Wales, January, 1916, says, "Undoubtedly the Hemlock (*C. maculatum*) . . . . . is a deadly plant, dangerous alike to stock and human beings. Late research indicates that all parts of the plant are poisonous, because of the presence of a resin known as *Cicutoxin* . . . ." In a previous article the same authority states, "Most little English children have had to learn the lines addressed to the . . . . 'pretty cow' who is warned not to chew the Hemlock rank. An ingredient of the witches' cauldron in *Macbeth* is 'root of Hemlock, digged i' the dark.'

"As a small boy I have always been taught to look upon the Hemlock with horror, as a sort of vegetable tiger snake in fact, and in walking through a dampish meadow, through which a brook meandered, I have been pulled aside by my elders, and kept under supervision if there were any Hemlocks about. That cows nibble the Hemlock, and that it has dire effects on them, their milk, and their butter, is so ingrained in me, as one of my beliefs, that to depart from it now would be sheer heresy. I would, therefore, again warn owners of dairy cattle against it; Pierpont Johnson notwithstanding, for in later years I have looked into the evidence against Hemlock and find its dangerous properties not overstated.



*Conium maculatum* (Linn).

("Agricultural Gazette of N.S.W.")

" Pierpont Johnson begins an account of the plant—The Hemlock is such a dangerous plant that all living in the country should render themselves familiar with its appearance. From its very poisonous nature it is always a dangerous plant to have in fields and pastures, as sheep will often eat it. Horses and cows refuse to touch the herb.

" The Hemlock was probably the plant used to poison Socrates, and it is believed to have been the usual poison administered to those sentenced to death by the Areopagites, in the days of ancient Greece. Many cases of poisoning of human beings, both in England and the Continent of Europe, have been verified ; in these cases it has been used as a pot-herb in mistake for some other plant. It must be remembered that the poisonous nature of Hemlock is beyond all dispute, unlike many of our so-called indigenous poison plants, further investigation of which, happily proves their evil reputation to be undeserved."

In " The Weeds, Poison Plants, and Naturalised Aliens of Victoria," published in 1909, Professor Ewart states, " It recently was responsible for the poisoning of a number of cows at Warrnambool, and also for the death of a child at Clunes. Fortunately its smell usually repels stock and children, but the plant is highly poisonous owing to the presence of the poisonous alkaloid (*coniin*), most abundant in the seeds, but also present in the leaves and stem. Goats appear to be largely immune to the action of the poison."

### DESCRIPTION.

A smooth, more or less purple spotted biennial, 2-5ft. high, the leaves are bright green, large and compound, the segments being deeply cut as in most plants of the natural order *Umbelliferæ*, to which the carrot, parsnip, and parsley also belong. It grows on waste places near hedges, by roadsides and streams ; stem hollow and smooth, and somewhat glaucous, with purplish dots. When bruised, the leaves emit a peculiarly repulsive mouse-like odor. The flowers are white or greenish white. The fruit is distinctive, being somewhat globular in shape, and each half is marked with five wavy ridges. It is found in temperate Europe and Asia, and naturalised in N.E. America, California, and Chile.

### ERADICATION.

These plants are large and conspicuous, and " on waste ground are best pulled up, piled, and burnt, and the ground, if possible, kept covered with other vegetation to prevent its re-establishment by seedlings. On cultivated ground it gives no trouble, though apt to spread along hedges, the borders of fields, the banks of streams, &c. Here, cutting down is sufficient, and the seed in the soil being short-lived, are soon exhausted " (Professor Ewart).

As this plant is certainly not widely spread in South Australia, occurring in a wild state in small patches, and only within the Corporations of Adelaide and Kapunda—as far as can be ascertained—it seems desirable that steps should be taken immediately by responsible authorities to stamp it out before the " seeds " ripen, about December or January. Cows and horses were seen to be grazing in allotments at Kapunda where the weed was growing, and there is the possible danger of it being eaten when the grass dies off, leaving only the green Hemlock to tempt the stock. Along the Torrens River the same danger exists, and in a thickly populated place like Hackney there is always the possibility of children eating the " seeds " of the Hemlock which roughly resemble those of Fennel (*Fœniculum vulgare,* Mill), which grows alongside it.

It might also be advisable to give publicity to the danger of growing this plant in home gardens.

Hemlock is not on the list of weeds proclaimed under the Noxious Weeds Destruction Act, South Australia.

# SOIL IMPROVEMENT.

A correspondent, farming in the Pinnaroo district, has submitted a number of questions which are of particular interest to those who are working the sandy soils of a similar nature to those to be met with in the area referred to. "Would it improve the sandy soil to plough in a green crop in August, and roll it well with a heavy roller?" he inquires. "Secondly, would you advise early ploughing, say, March, and sowing the green crop before rain fell? Third, would you advise feeding off the manure crop, or allowing it to grow untouched? Fourthly, is there any danger of overloading the soil with green manure; and, finally, do you favor light dressings of farmyard manure, frequently applied, or a heavy dressing, say, every five years?"

To these the Superintendent of Experiments (Mr. W. J. Spafford) has replied as follows:—

1. A green crop ploughed in as manure in August and then heavily rolled will most certainly improve a sandy soil; indeed, this is how sandy soils the world over are reclaimed. The time of the year for ploughing in can hardly be fixed, other than being sure that it is done before the spring is too far advanced, as it depends very largely on the state of growth to be turned under; the plants should be still soft and sappy, so that they decompose readily when covered. The later in the year that this operation is carried out the heavier and more perfect should the rolling be, to get the best results.

2. The earlier the green manuring crop is sown the better, as it will then make good growth before the cold weather sets in, and can be ploughed under early in the year. The land should be stirred in February or March, and if an early autumn rain does not fall, the seed can be sown dry, so as to have the job finished before you are ready to commence ordinary seeding operations.

3. If the land is worked out, *i.e.*, of very low fertility, it would be much better to get the full growth of the crop ploughed in, instead of feeding it off with stock. If it is a matter of preventing the soil from becoming worked out, the green manuring crop can be fed off, and

the droppings will then be ploughed in with the second growth; the advantage of this method is that you get a direct return from the manuring crop through the stock. The best way to prevent sandy soils from being worked out, which happens quickly in our climate, is to crop them seldom and stock them heavily, being careful not to lose the droppings from the stock.

4. The only soils likely to get more green organic matter put into them than is good for any one year are very wet, cold soils and those exceptionally rich organic soils that have not yet been sweetened. In your district these conditions do not exist, and you cannot put too much green sappy organic matter into any of your sandy soils, providing the soil gets reasonable after treatment.

5. The best way to apply farmyard manure is in fairly heavy dressings, repeated every few years; but the cereals should never follow immediately after such dressings. This means that heavy dressings of farmyard manure should only be used when a rotation of crops is being carried out, and a bulky fodder crop, such as mangolds, kale, &c., follow the stable manure. For cereals only, the manure should be applied lightly and often.

# ADVISORY BOARD OF AGRICULTURE.

The monthly meeting of the Advisory Board, which was attended by Messrs. F. Coleman, A. M. Dawkins, C. J. Tuckwell, J. Miller, G. Jeffrey, W. J. Colebatch, T. H. Williams, G. R. Laffer, M.P., and H. J. Finnis (Acting Secretary) was held on Wednesday, November 8th.

### OFFICERS.

Mr. F. Coleman was selected as Chairman for the current year, and Mr. G. Jeffrey was appointed Vice-Chairman.

### CONGRESS RESOLUTIONS.

Various resolutions which were passed by the 1916 Congress were dealt with. One resolution, urging the compulsory marking of cold-stored, imported, and pickled eggs, was referred to the Minister of Agriculture, with a statement to the effect that the Board did not indorse the recommendation. Others were referred to the Minister without comment.

Consideration was given to the proposal that Branches should be asked to express an opinion on the question of prohibiting the importation of eggs from Asiatic countries. The Board decided that this matter should not be submitted to the Branches.

Thirty-three names were added to the rolls of existing Branches.

# ANALYSES OF FERTILISERS.

The following are the results of analyses (other than those published in August last), made by the Agricultural Analyst (Mr. C. E. Chapman), of samples of fertilisers taken by inspector and assistant inspectors under the Fertilisers Act since the beginning of the present year :—

| Name of Firm and Fertiliser. | Phosphate. | | | | | | Nitrogen. | | Potash. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Water Soluble.* | | Citrate Soluble. | | Acid Soluble. | | | | | |
| | Vendor's Guarantee | Result of Analysis. | Vendor's Guarantee | Result of Analysis. | Vendor's Guarantee | Result of Analysis. | Vendor's Guarantee | Result of Analysis. | Vendor's Guarantee. | Result of Analysis. |
| Adelaide Chemical & Fertiliser Co., Ltd.— | °/o | °/o | °/o | °/o | °/o | °/o | °/o | °/o | °/o | °/o |
| Potato manure No. 1 (from E. & W. Hackett's store, Adelaide) | 20·00 | 17·5 | 10·0 | 9·9 | 5 0 | 5·6 | 1·5 | 1·7 | 4·5 | 4·6 |
| Potato manure No. 1 (from Silbert, Sharp, & Bishop, Ltd., store, Adelaide) | 20·00 | 28·7 | 10·0 | 8·5 | 5 0 | 4·5 | 1·5 | 1·6 | * | — |
| Special Lawn Manure (from E. & W. Hackett's store, Adelaide) | 7·0 | 11·8 | 7·0 | 7·0 | 8·0 | 4·2 | 6·0 | 6·7 | — | — |
| Special Bone Manure (from Silbert, Sharp, and Bishop, Ltd., store, Adelaide) | — | — | — | — | 17·5 | 24·0 | 2·4 | 3·1 | — | — |
| Bone and super. (from S.A. Fruit and Vegetable Co., Adelaide) | 23·0 | 18·0 | 7·0 | 13·5 | 10·0 | 6·6 | 1·4 | 2·2 | — | — |
| Miller's Lime, Ltd.— | | | | | | | | | | |
| Miller's potash lime fertiliser | — | — | — | — | — | — | — | — | 2·5 | 2·1 |
| Wallaroo-Mt. Lyell Fertilisers, Ltd.— | | | | | | | | | | |
| Potato manure No. 1 (from Silbert, Sharp, and Bishop, Ltd., store, Adelaide) | 20·0 | 19·9 | 10·0 | 8·2 | 5·0 | 6·3 | 1·5 | 1·7 | 4·5 | 4·6 |
| Vine manure | 20·0 | 22·2 | 10·0 | 8·5 | 5·0 | 4·5 | 1·5 | 1·48 | 4·5 | 4·28 |
| Potato manure No. 2 | 30·0 | 34·9 | 4·0 | 1·3 | 4·0 | 3·5 | 1·20 | 1·1 | 4·2 | 3·37 |
| Bone super | 15·0 | 18·0 | 15·0 | 10·2 | 4·0 | 7·7 | 1·60 | 1·69 | — | — |
| Grass manure | 12·0 | 12·0 | 14·0 | 15·9 | 10·0 | 9·8 | ·50 | ·69 | ·50 | ·64 |
| Metropolitan Abattoirs Board— | | | | | | | | | | |
| Blood manure (from A. H. Hasell's store, Port Adelaide) | — | — | — | — | — | — | 13·0 | 13·4 | * | — |
| Bone manure No. 1 | — | — | — | — | 32·0 | 32·9 | 4·5 | 4·9 | — | — |
| Bone manure No. 2 | — | — | — | — | 25·5 | 29·6 | 4·7 | 5·7 | — | — |

* Amended certificate of guaranteed constituents received, withdrawing potash from guarantee.

November 21st, 1916.

GEO. QUINN, Inspector of Fertilisers, &c.

# TILLAGE OF THE SOIL FOR WHEAT GROWING.

[An address delivered by the Superintendent of Experiments (Mr. W. J. Spafford) before the Pinnaroo Branch of the Agricultural Bureau.]

South Australian farmers are rightly noted throughout Australia as good cultivators of the soil, and it is because of their expertness in handling soils that the other States of the Commonwealth are eager to secure them as settlers. The climatic conditions of most of the wheat-growing parts of this State have led to this condition of affairs, for in anything but the good seasons it has been found to be quite essential to give the soil much and good tillage if payable crops are to be secured. Many South Australian farmers are able to retire as comparatively young men and live in the city or larger towns, and I personally think that this is mainly due to the fact that they have cultivated their farms well. Further, I think the days of extraordinary improvements in our practice are past, such for instance as the introduction of the use of superphosphate, with its wonderful and enormous advancement in our crop production, and that other than the appearance of new machines or implements considerably cheapening the cost of production, whatever progress we make will be gradual, and a good deal of the improvement will have to do with the handling of our soils. We have certainly done much for a young country towards evolving a system of soil treatment suitable to our special conditions, but there is still much to do, and the sooner we understand the why and the wherefore of the different operations, the sooner will we become masters of the situation, and the sooner will the average yield of the cereals be increased throughout the State. That we have not yet realised to the full the advantages of cultivation, is easily seen by studying the work put into the land in the better farmed countries, where yields are high; not, of course, that the methods used in those places would suit our conditions, but they show what a large amount of expensive work these farmers are prepared to do, knowing well they are well repaid for all the work done. This point was brought home to me again only last weducing a letter from one of our soldiers in France, who said "it frighten you to see the work the farmers put into their land in soil plough, roll, harrow, roll, cultivate, roll, harrow, roll, harrow, roll, harrow, roll, harrow, and if they have any time before seeding they roll and harrow again. You see the benefit of this work, however, in the crops, most of which are thick and as level as billiard tables."

### NEED FOR CULTIVATION.

Soil cultivation is not necessary for the growth of plants, as we see in Nature the land covered with plants, but it is indispensable to the growth of some plants and absolutely essential to the good growth of most plants we know as "cultivated" plants. This is seen very often when the land has been left idle after having carried some cultivated crop: the cultivated plants very quickly disappear from the soil or else grow very weakly, and this is accounted for by the fact that the plants have been pampered so long that they have lost their original hardiness, and so cannot compete with plants not so treated.

### THE OBJECTS OF CULTIVATION.

*Deepening the Soil.*—When we set about growing crops we aim at getting as much off a given area as possible, and so we crowd more plants on to the land than would grow there naturally, and to compensate for the restricted surface soil space for the roots of each plant we deepen the soil. This deepening the soil allows the roots of plants to feed at greater depths than they can in unstirred land; not that plants in nature cannot send their roots to great depths, but in cultivated land they can do this with greater uniformity and certainty. Also the roots of plants need an unfailing supply of oxygen if they are to continue growing, and in land left uncultivated this supply is very limited below the immediate surface, and so most quick growing plants on such land must keep their roots near the surface to obtain their necessary quantity of oxygen. Cultivating the soil deepens it for plants, because it considerably increases the quantity of oxygen by exposing the soil to the air, as well as by admitting the roots to penetrate to greater depths with greater ease than if left untouched.

### WATER REQUIREMENTS OF PLANTS.

The growth of all plants depends very largely on the available supply of moisture; indeed, water must be constantly and uninterruptedly passing through the tissues of the plants from the roots to the leaves and then into the atmosphere, if the plant is to make growth. The quantity of water needed by plants is enormous; it has been measured for different cultivated plants and ratios worked between it and the dry matter formed. These ratios have varied considerably for all types of crops, but if we take the average European figure for wheat, which very possibly will be the minimum with us, it will give an idea of how enormous is the amount of water that passes through the wheat crop during its growth. The amount of water passing through wheat plants to produce 1lb. of dry matter is 300lbs., so with a 2-ton crop of wheaten hay retaining 10 per cent. of moisture, the water necessary to actually pass through the plants during its growth is a minimum of 1,209,600lbs., or 120,000galls., or 540 tons to the acre. Now all of this moisture must come from the soil, and cultivation is intimately connected with its storage and distribution. In the first place the loosening of the land prevents the rain that falls from running off the surface, and so it enters the soil. Also, as the spaces between the particles is much greater in cultivated than in uncultivated land, it holds much more water before it becomes saturated with it. But as the rain falls in showers with varying periods of time between them (in some cases up to months) plants are wholly dependent on the power of soils to hold this moisture, and on the movement of the water in the soil.

### THE RETENTION OF MOISTURE BY THE SOIL AND THE MOVEMENT OF THIS MOISTURE.

When rain falls and enters the soil it gradually sinks under the attraction of the forces of gravity, but leaves a film of water surrounding all of the soil particles, and each of these films is in contact with its neighboring films. These films are held by the particles by what is known as "surface tension," or the attraction of surfaces of solids for liquids, and is the same power that makes the hairs of a brush cling together when wet, and that keeps the inside of a smooth vessel like a glass tumbler wet, although the liquid has been poured out and the glass kept upside down for some time. The water continues to sink through the soil, all the time thinning out the film surrounding the particles like stretching a rubber band, until the force of the attraction of the surfaces of the particles is great enough to equalise the pull of the forces of gravity, and then the moisture sinks no farther. When this stage is reached evaporation of moisture at the surface of the soil immediately upsets the equilibrium by thinning the film at the surface. The forces of gravity are overcome by this thinning of the film at the surface, as the greatest pull of the film is at the thinnest part, like it is on a stretched rubber band, and the moisture rises from the subsoil until a new equilibrium is reached. This process of evaporation at the surface and rise of subsoil moisture is quite continuous on unworked soil, once natural drainage hasducing place.

This rise of subsoil moisture can, of course, only take place in soil the film is continuous and unbroken, so it is easy to see the part cultivation plays in controlling the loss of moisture from the soil. It is not hard to realise that if the point at which evaporation of soil moisture is taking place is three inches below the surface, the amount of moisture drawn off will be very considerably less than if it is right at the surface of the soil. This is just what we do when we cultivate; we break the continuity of the particles to the depth that we work the land, with the result that the moisture only rises to the line where the implement stirred the soil. Of course evaporation takes place from there, but it is only a fraction of what it is where the soil is left firm and the film intact right to the surface. After the first heavy rain the continuity of the film is re-established, and so the need of a cultivation after rains. This is perhaps more easily explained by what happens with a brick and a sponge; if a sponge be filled with water and a dry brick hung so that it touches the wet sponge it will withdraw practically all of the water from the sponge, but if a brick be filled with water, a dry sponge will draw but little of the water from the brick. When we cultivate we make the surface of the soil like the sponge, and if we are trying to conserve moisture we never let the surface get like a brick, but always keep it like the sponge, loose and open.

### AVAILABILITY OF MINERAL MATTER AS PLANT FOOD.

Mineral matter to be available to plants must be soluble in soil moisture, and so far as is known this is the only way in which plants can utilise mineral substances. Soils in the first place are formed by the action of natural agents on the solid rocks, and it is the continuing of these operations that so reduce the tiny fragments of rocks that parts of them become soluble in soil moisture and so available to plants. Cultivation helps very considerably in this work by exposing much of the soil to the weathering agents, and particularly by bringing up some of the more deeply seated soil particles that would otherwise never come under their influence.

### WORK OF USEFUL SOIL BACTERIA.

Soil bacteria play a very important part in soil fertility, more particularly in the fixing of nitrogen into an available mineral form, one class collecting and storing nitrogen from the atmosphere and another splitting up organic matter into available substances. These bacteria are encouraged and their activities greatly increased by the cultiva- f the soil, because the moisture content and the oxygen is in- Further, these bacteria can only work actively within a range of temperature, and the soil is kept between the mes for a much longer period when cultivated than when left untilled. Indeed, as the common essential requirements of life, including these bacteria, are moisture, warmth, and oxygen, well-worked fallow land in our climate is almost ideal for their activities; the moisture is kept at such a depth that it does not readily get cold nor yet soon become hot, and every cultivation admits a plentiful supply of oxygen. This helps to explain why it is that up to the present nitrogenous manures have not proved profitable on good fallow land.

### DESTRUCTION OF WEEDS.

The presence of weeds in a crop means that the crop has to struggle against hardier competitors for soil space, food, and moisture, and cultivation in some form or other is always resorted to in order to reduce to a minimum this battle for existence.

### SEED BED.

Practically all the cultivations given to the land lead in the end to formation of the seed bed, in which the crop germinates and makes its early growth. Most crops depend very largely for success on the condition of the seed bed into which they are sown, and so all cultivations should be so given as to tend towards the ideal seed bed for the crop to be grown. This dependence on the seed bed is very marked with the wheat crop in this State, particularly in the dry years.

The ideal seed bed for wheat is land free from weeds, that has been ploughed up and so worked down that only the immediate surface is loose, and the under layers well compacted together; and all tillage operations undertaken should do something towards the creating of such a seed bed.

### LOCAL PRACTICE.

Now the practice of South Australian farmers is mainly that known as bare fallowing the land, which, briefly, consists of ploughing the land as soon after seeding operations are completed as is possible, and working it with various implements until the seeding season arrives. As was pointed out, all forms of cultivation lead in the end to the formation of an adequate seed bed, and this fact should never be lost sight of when a tillage operation is about to be undertaken. The ploughing breaks up the soil, giving it a very thorough aeration, admits the rains, and buries the organic matter which always collects on the surface. The subsequent cultivations keep the land free from the plant-food and moisture robbers—the weeds—and keep the surface of the soil free from a solid crust. Now when heavy rains fall after the land is ploughed no difficulties to the production of ducing seed bed arise; the rains compact the underlayers, and the su cultivations clean the land, and prevent the loss of the moi in soil breaking the continuity of the film of moisture in the productio that loose mulch of earth at the immediate surface of the soil, which is one of the essentials of the ideal seed bed. When heavy rains do not fall after ploughing, this seed bed is not so easily obtained, for the underlayers do not become compacted together, and so the operations must be varied, and a heavy roller is required to do the work usually done by the rains. When the ploughing is done late in the season, say after the middle of September, when there is only a small chance of heavy rain falling, this rolling to compact the underlayers should be considered as an essential operation. Of course in local practice it is usually recognised that as the ploughing season advances the depth to which the land is ripped up is reduced, so that anything ploughed after, say, the middle of September, which can be considered as late fallow, is usually only turned over to a depth of about half that at which the fallowing was commenced in July. This reducing the depth as the season advances, although in most cases the reason is not known, is done so as to get as near the ideal seed bed as possible; but that it is not necessary and certainly not as good as if the after treatment is correct, is clearly shown by the result obtained from the "cultivation" plots at Roseworthy Agricultural College.

### LATE FALLOW PROPERLY CULTIVATED.

Here, four plots are ploughed early, *i.e.*, in July, to a measured depth of 7in. and treated in various ways: plot 1 rolled within a few days of ploughing and cultivated afterwards whenever necessary; plot 2 harrowed within a few days of ploughing and then cultivated whenever necessary; plot 3 left throughout the winter and then cultivated three times during the season; plot 4 cross skim-ploughed and then cultivated whenever necessary. Two plots are ploughed late, *i.e.*, after September 1st plot 5 is ploughed 7in. and heavily rolled the same day as ploughed and cultivated or even rolled again if necessary—good tillage throughout; plot 6 is ploughed only 4in. deep, cultivated after rain and again when necessary, but not rolled.

For the four years 1912-1915 these plots have yielded on the average—

| | |
|---|---|
| Plot 1 | 1 ton 10cwts. 54lbs. hay |
| " 2 | 1 ton 9cwts. 75lbs. " |
| " 3 | 1 ton 9cwts. 49lbs. " |
| " 4 | 1 ton 11cwts. 33lbs. " |
| " 5 | 1 ton 12cwts. 36lbs. " |
| " 6 | 1 ton 4cwts. 36lbs. " |

These figures show the greatest return for plot 5, the late-fallow ploughed 7in. deep, and the lowest yield for plot 6, the late-fallow plot ploughed only 4in. deep but not rolled. Details of these cultivation plots are to be found in the sixth report on the Permanent Field Experiments of Roseworthy Agricultural College, appearing in the October issue of the *Journal of Agriculture,* 1916.

## DEPTH OF PLOUGHING.

It is almost unanimously declared by farmers of this State that shallow ploughing is the best that can be carried out under our conditions; and to make money quickly off the farms, mainly because the cost of production is reduced due to the operation of ploughing being less expensive, and the after cultivation necessary to prepare the ideal seed bed is diminished, this is so. This state of affairs can only last while our cultivated soils are new—all of them are still comparatively virgin—and it is only good for the individual, but is bad for the soils and so for the State. When the day comes that farmers as a whole work the farms for a living, with the intention of leaving them to their sons, instead, as is the case now, of making money quickly from them and then selling out, then will deeper ploughing be the rule rather than the exception. It is only reasonable to suppose that the turning over and stirring up of soils to greater depths will improve the fertility of the majority of the soils to a greater extent than if they are only ploughed very shallow, and this is certainly so, although the operation of the former is more costly than the latter. Many farmers argue that all soils will produce more if ploughed shallow than if ploughed deep, but this is not so, as the results obtained at Roseworthy Agricultural College show. For the five years 1911-1915 plots ploughed at the following depths produced on the average—

| | |
|---|---|
| 2in. ploughing | 15bush. 27lbs. |
| 4in. " | 16bush. 19lbs. |
| 6in. " | 16bush. 22lbs. |
| 8in. " | 17bush. 19lbs. |
| 10in. " | 17bush. 13lbs. |
| 12in. " | 17bush. 28lbs. |

Details of these plots are also to be found in the report referred to above.

## SUMMARY.

1. Cultivation is not necessary to the growth of plants, but is necessary to the good growth of cultivated crops.

2. Cultivation deepens the soil and so allows us to crowd more plants on a given area than would grow there naturally.

3. The water requirements of plants is enormous, and cultivation helps the plants by allowing more of the rain that falls to enter the soil.

4. Cultivation helps the soil to retain more moisture by breaking the continuity of the film surrounding the particles and so reducing losses by evaporation.

5. Mineral matter to be available to plants must be soluble in soil moisture, and cultivation by exposing much of the soil to weathering agents increases the amount of available mineral matter.

6. Cultivation encourages the activities of the useful soil bacteria.

7. Cultivation destroys the robbers of plant food, oxygen and moisture—the weeds.

8. The success of cultivated crops is very largely dependent on a good seed bed, which for wheat consists of soil that has been ploughed up, freed from weeds, and so worked down that the underlayers are very compact and only the immediate surface is loose; all cultivations lead ultimately to the formation of the seed bed.

9. Well worked early bare fallow is the simplest way to produce a good seed bed for wheat in this State.

10. Land ploughed after the heavy rains have finished should be rolled to compact it sufficiently to fulfil the requirements of the seed bed.

11. For the good of most soils, and so for the good of the State, soils should be ploughed deeper than is the usual practice.

## FEED FOR PIGS.

"The principal constituent required for feeding pigs is protein, and this element is supplied in separated milk; whole milk, testing 5 per cent. fat, possesses too much fat for pigs to assimilate to advantage," remarks the Dairy Expert (Mr. P. H. Suter). "The composition of milk testing 5 per cent. butter fat is:—Water, 85.9; fat, 5.0; casein, 3.0; sugar, 5.0; albumen, .4; ash, .7; and that of separated milk—water, 91.15; fat, .1; casein, 2.9; sugar, 4.8; albumen, .38; ash, .67. If it is desired to reduce the whole milk to the fat basis of separated milk, it will be necessary to add 500galls. of water to every 100lbs. of whole milk. It is rather an expensive procedure to feed pigs on whole milk, when a cheaper class of fat can be secured. As to the practice of diluting pure milk with water to put it on an equal basis with separated, it will be noticed from the composition of whole and separated milk that they are about equal in solids, not fat; it is therefore necessary to reduce the fat content until it is the same as the separated. Give the food in a sloppy condition when the pigs are young, and gradually increase the consistency as the animals advance in age. When they require water, they will appease their thirst, and it is very poor policy to load the stomach of the pig with water in order that they may consume a small portion of the solid matter."

# THE AGRICULTURAL BUREAU.

## THE TWENTY-SEVENTH ANNUAL CONGRESS.

*(Continued from page 296.)*

## WHEAT YIELDS PAST AND FUTURE, WITH A REFERENCE TO THE PRINCIPAL FACTORS THAT GOVERN THEM.

An address on "Wheat Yields, Past and Future, with a Reference to the Principal Factors that Govern Them," was read by Professor Arthur J. Perkins, Director of Agriculture, as follows:—

### INTRODUCTORY.

The general progressiveness of any country in the main lines of work which occupy the activities of its inhabitants may be gauged in various ways; but when that country is dependent almost exclusively upon rural production, I know of no more striking criterion in this connection than the rate of improvement shown by the average acre yields of its main crops over successive periods of time. Here in South Australia we are so essentially a wheat growing community, that for the present at all events, the measure of our general agricultural progress must be read in our apparent ability to handle wheat to increasing advantage. And whilst I know that we have no particular reason to feel ashamed of our past, I do not anticipate that any one of us imagines that we have as yet reached our zenith as wheat growers. It should be noted that even at the present time progress continues to be registered in countries in which wheat has been grown continuously for thousands of years, and we who have scarce emerged from the pioneering stage can have no reason to doubt that we shall as time progresses be able to improve on our present average yields. I propose this evening to discuss some of the more obvious facts which I imagine will act as chief contributing cause to future progress. At first, however, I shall ask you to consider what forward steps have already been taken in the course of 60 years of farming.

### PAST PROGRESS IN WHEAT GROWING.

In this connection it must be stated that with the average individual the returns from single years show a tendency to stand out rather too prominently in the foreground, and according as temperamentally we are inclined to pessimism or optimism, we remember the lean or the fat years, to the exclusion of the intermediate ones, which should alone enter into rational calculations. Neither the lean nor the fat years can convey a true picture of the average productivity of any country; alone the mean returns from a sufficiently large number of consecutive seasons can do this. Ten years, or a decade, represent for the purpose both a reliable and a convenient period of time, and in Table I. I have endeavored to show what has been our progress as wheat growers over the five successive decades extending between 1866 and 1916.

TABLE I.—SHOWING PROGRESS IN SOUTH AUSTRALIAN WHEAT GROWING BETWEEN 1866 AND 1916.

| Successive Decades. | Average Area under Wheat for Grain. Acres. | Average Yield per Acre. Bushels. |
|---|---|---|
| 1866-7 to 1875-6 | 665,358 | 9.48 |
| 1876-7 to 1885-6 | 1,567,878 | 6.25 |
| 1886-7 to 1895-6 | 1,683,515 | 5.98 |
| 1896-7 to 1905-6 | 1,753,753 | 5.37 |
| 1906-7 to 1915-6 | 2,091,420 | 9.85 |

That in the earlier years of settlement we should have opened with the comparatively high average of 9½bush. to the acre is comprehensible enough; the area sown at the time was relatively insignificant and probably restricted to the choicer localities. But as settlement extended and areas under wheat assumed greater importance, our yields appear to have fallen away very rapidly, and for the 30 years preceding the last decade the average wheat yield was consistently below 6bush. an acre. There are no doubt many and sufficient reasons for these low figures, and chief among them, probably, the fact that settlers were dealing with virgin areas as yet incompletely reclaimed from scrub and forest; perhaps, too, it must be admitted that in those years we had not as yet mastered the art of growing wheat successfully under local conditions of climate and soil. Whatever may have been the case, however, in these earlier years, a rise from 5 1-3bush. to close on 10bush. to the acre in the last decade represents very solid progress indeed. Nor was this improvement in yields achieved at the expense of the area under crop, since whereas in the three preceding decades the area under wheat showed an average increase of about 10,000 acres per annum, this increase rose to an average of 25,000 acres per annum between 1906 and 1916.

The value to the State of this progress in the art of wheat growing can be translated into terms of hard cash. Taking wheat at average pre-war prices, it represents for the 10 years under consideration an addition to general State revenue of close on 16½ millions sterling, or over one and a half millions per annum.

Hence after 30 years of comparative stagnation our agricultural interests have in the last decade taken a very substantial step forward, and it is for us to consider whether in the next decade we can make still further progress. Are we going to rest satisfied with an average yield, good year, bad year, of about 10bush. to the acre? Last season there were in South Australia nearly 2,750,000 acres under wheat for grain, and there is every reason to suppose that as an annual average this area will be exceeded during the course of the next decade. Every increase of 1bush. above the average yield of the preceding decade will, therefore, at normal rates represent to the State an additional return of at least £500,000 per annum.

### GENERAL POSITION OF THE WHEAT GROWING COUNTRIES OF THE WORLD BETWEEN 1908 AND 1912.

There are, of course, limits to the possible profitable increase in the average yields of crops; and before taking into consideration steps that would probably lead to an improvement in our own position, it is important that we should realise what has already been done in older wheat growing countries. And for the purpose I have summarised below in Table II. various data relating to the principal wheat growing countries of the world between 1908 and 1912.

TABLE II.—SHOWING WHEAT RETURNS FROM CHIEF WHEAT GROWING COUNTRIES OF THE WORLD (1908-12).

| | Average Yield per Acre. Bushels. | Average Total Crop Yield. Bushels. |
|---|---|---|
| 1. Belgium | 37.81 | 14,747,000 |
| 2. Netherlands | 35.51 | 4,830,000 |
| 3. United Kingdom | 31.77 | 59,087,000 |
| 4. New Zealand | 31.02 | 7,763,000 |
| 5. Germany | 30.77 | 145,552,000 |
| 6. Sweden | 30.06 | 7,149,000 |
| 7. Japan | 20.45 | 23,729,000 |
| 8. Austria | 19.86 | 59,745,000 |
| 9. Canada | 19.18 | 168,851,000 |
| 10. France | 19.02 | 306,479,000 |
| 11. Hungary | 18.13 | 167,890,000 |
| 12. Bulgaria | 17.41 | 46,711,000 |
| 13. Roumania | 16.67 | 78,491,000 |
| 14. Servia | 14.72 | 13,810,000 |
| 15. Italy | 14.53 | 171,366,000 |
| 16. United States | 14.03 | 668,798,000 |
| 17. Spain | 13.54 | 127,997,000 |
| 18. **Australia** | 12.13 | 82,347,000 |
| 19. India | 11.75 | 344,957,000 |
| 20. Uraguay | 11.68 | 7,955,000 |
| 21. Argentina | 11.18 | 170,713,000 |
| 22. **South Australia** | 11.18 | 22,145,000 |
| 23. Russia in Asia | 9.95 | 163,972,000 |
| 24. Russia in Europe | 9.62 | 520,814,000 |
| 25. Algeria | 9.38 | 32,089,000 |

In this Table I have placed the various countries in order of merit of their average acre yields, and not in the order of importance of their total production. I have done this advisedly, because I wished to emphasise the relative state of advancement attained to by the wheat-growing countries of the world; and in contemplating their achievement we shall, I am afraid, find little to boast of in our own present-day averages; we come, indeed, perilously near the bottom of the list. The lower yields of Russia in Europe and of Russia in Asia are in a measure set off by enormous areas under crop; and in reality there is but Algeria alone, with its primitive native farmers, to save us from bringing up the rear.

An examination of Table II. will show that from the point of view of present yields the wheatgrowing countries of the world fall into several distinct classes.

In a class by themselves are those few countries in which average yields exceed the 30bush. limit; these are countries in which skill and enterprise make the most of favorable conditions of both climate and soil. And in these times, shall we not view with admiration martyred Belgium, one of the most densely populated regions of the earth, one of its chief industrial centres, leading the world also in the production of wheat? It must, however, be recognised, I think, that in these privileged countries, climate is a very essential factor in the realisation of uniformly high yields. No country in my view, however great the skill and efforts of its farmers, is likely to attain to a general average of 30bush. of wheat to the acre unless it is able to raise, with uniform success, what are known as the winter varieties of wheat. And this, indeed, is the case for the six countries included in our leading class; it may ultimately prove to be the case, too, for Japan, for Austria, for Canada, for Hungary, and even for France; but hardly for the balance of the wheat-growing countries of the world, excepting over limited areas of their territory.

The second class may be said to include those countries which I have just named, whose present yields are, for a variety of reasons, relatively low, but which may, in later years, entitle them to take rank in the first class.

In the third class must be placed the balance of the wheat-growing countries of the world in which climatic conditions are generally less favorable to high yields; and as soon as we find time to settle down to more thorough methods of cultivation, there appears to me no valid reason why we should not, in the course of time, take a leading position in this class. If countries like Bulgaria and Roumania are able to secure general averages of 16bush. to 17bush. to the acre, there are no physical reasons which can hinder us from doing equally well, if not better.

### PROBABLE STATE MAXIMUM DECENNIAL WHEAT AVERAGE.

What, then, it may be asked, is the highest decennial average wheat yield to which in the course of time South Australia may legitimately aspire? This is not a question that admits of a summary reply. It may be possible to forecast, with sufficient accuracy, future maximum yields for an individual farm with which one is familiar; it may be logical to extend these conclusions to neighboring lands similar in character; it may even be tolerably safe to do so for other districts in which conditions are supposed to be more or less similar; but to endeavor to measure the future rate of progress of a vast area of agricultural land covering every type of climate and soil, is a task not easy of solution. In this connection I think that we shall probably agree that in any country maximum yields are influenced chiefly by the following factors:—(1) Local climate; (2) soil characteristics; (3) cultural methods and practices; (4) prevalence of diseases and pests; (5) economic conditions. Of all these factors, I think that in the matter of maximum yields it is the influence of climate that counts most—it is an absolute factor, and not a relative one, and one which our own efforts can do little or nothing to mitigate. I have already had occasion to refer in a general way to this influence of climate on possible wheat yields; the point raised, however, is of sufficient importance to bear emphasising here. It should be clearly understood that whatever may be the yields secured in other countries differently situated, local climate fixes definitely for us a local limit beyond which we cannot hope to rise. Thus, independently even of the vagaries of our rainfall distribution, which we know not to be negligible, local conditions are such as to limit the period of growth of a wheat crop to six or seven months, according to seasons and districts. Experience, on the other hand, shows that this relatively short period of time is altogether insufficient for the successful exploitation of the heavy yielding winter wheats, which demand, as a rule, a period of growth extending into 10 months. Hence, however great and well directed our efforts, a climate which confines us to the cultivation of relatively low-yielding spring types of wheat will never permit us to emulate the yields of Belgium and New Zealand. And whilst I must recognise that in certain seasons and in certain districts individual yields of 40bush. and over can and have been, realised in South Australia, I am of opinion that our general climatic conditions are such as to render 20bush. to the acre an extreme maximum, so far as we are concerned, in the way of a general State decennial average. That we should be able to rise, however, from 10bush. to 20bush. would represent an enormous stride in progress, and I can hardly hope that it will be realised in our time.

Such an advance would imply not only radical changes in our general methods and practices, but in addition the incidence of overwhelmingly favorable economic conditions.

### AVERAGE YIELDS IN THE STATISTICAL DIVISIONS AND THE COUNTIES.

I have dealt hitherto with our average wheat yield from the point of view of the State taken as a whole. It should be realised, however, that our acreage under wheat is not stationary, that it increases from year to year, and that every season sees new acres under wheat reclaimed from scrub or grass. And unquestionably these new areas exercise at first a depressing influence on the general State yield. In the circumstances State averages fail to bring out sufficiently the real progress which has within recent times been effected in our older settled districts. It will be of interest, therefore, to consider at closer quarters average yields in the decade under consideration. And in the first place let us examine these yields from the point of view of the large divisions adopted by the Statistical Department as summarised below in Table III.

TABLE III.—SHOWING AVERAGE WHEAT DATA FOR THE STATISTICAL DIVISIONS OF SOUTH AUSTRALIA, 1906-1916.

| | Average Yield per Acre. Bushels. | Average Total Production. Bushels. | Average Total Acreage. Bushels. |
|---|---|---|---|
| 1. Lower North | 12.45 | 7,464,161 | 599,531 |
| 2. Central | 10.39 | 6,430,527 | 618,915 |
| 3. South-Eastern | 8.33 | 1,856,257 | 222,840 |
| 4. Upper North | 8.23 | 2,318,745 | 281,733 |
| 5. Western | 6.76 | 2,488,248 | 368,084 |

The Lower North Division, which headed the list of wheat averages during the last decade, owes this position not only to its great value as farming country, but also to the fact that there is within its boundaries but little land as yet unreclaimed for wheat. In the Central South-Eastern, and Western Districts, on the other hand, large tracts of country have within recent years been thrown open to cultivation, and the low yields from these imperfectly reclaimed areas have during the last decade had a depressing influence on the average yields of the Divisions concerned. And we may anticipate that as farming becomes more normal in these new areas the average yields of the Divisions will show considerable improvement. Low yields in the Upper North Division, on the other hand, are, as is well known, the unavoidable consequence of a low and uncertain rainfall.

An examination of the yields of the counties will give us an even closer insight into the wheat-producing capacities of our various districts. I am afraid that local geography is very much neglected in our midst; and I have frequently been astonished to find that rural

members of the community are not always aware of the name of the county in which their farms happen to be situated. I have, therefore, thought it well to inscribe the average yields of our wheat-growing counties on a map specially prepared for me by the kindness of the Surveyor-General, Mr. E. M. Smith. This map may be taken to illustrate Table IV., which is given below.

Table IV.—Showing Average Wheat Data in Wheat Growing Counties, 1906-16.

| Counties. | Division. | Average Yield per Acre. | Average Total Production. | Average Total Acreage. |
|---|---|---|---|---|
| 1. Grey | S.E. | 14.61 | 83,058 | 5,685 |
| 2. Light | C. | 14.12 | 1,260,492 | 89,270 |
| 3. Stanley | L.N. | 13.56 | 2,407,171 | 177,520 |
| 4. Victoria | L.N. | 13.53 | 1,993,984 | 147,375 |
| 5. Burra | L.N. | 12.28 | 318,408 | 25,929 |
| 6. Fergusson | C. | 12.19 | 1,643,943 | 134,860 |
| 7. Adelaide | C. | 11.62 | 144,425 | 12,429 |
| 8. Daly | L.N. | 11.57 | 2,626,205 | 226,984 |
| 9. Gawler | C. | 11.49 | 1,302,656 | 113,373 |
| 10. MacDonnell | S.E. | 10.27 | 61,158 | 5,955 |
| 11. Robe | S.E. | 9.97 | 60,348 | 6,053 |
| 12. Frome | U.N. | 9.83 | 1,097,991 | 111,698 |
| 13. Buckingham | S.E. | 9.69 | 299,654 | 30,924 |
| 14. Hindmarsh | C. | 9.66 | 169,465 | 17,543 |
| 15. Dalhousie | U.N. | 8.94 | 848,621 | 94,924 |
| 16. Chandos | S.E. | 8.91 | 906,913 | 101,786 |
| 17. Alfred | C. | 8.41 | 426,791 | 50,748 |
| 18. Le Hunte | W. | 8.04 | 7,035 | 875 |
| 19. Musgrave | W. | 7.92 | 160,237 | 20,232 |
| 20. Sturt | C. | 7.90 | 506,674 | 64,136 |
| 21. Jervois | W. | 7.89 | 780,826 | 98,964 |
| 22. Eyre | C. | 7.63 | 499,239 | 65,431 |
| 23. Flinders | W. | 7.60 | 468,251 | 61,612 |
| 24. Buxton | W. | 7.40 | 10,197 | 1,378 |
| 25. Robinson | W. | 6.84 | 423,499 | 61,915 |
| 26. Kimberley | L.N. | 6.76 | 108,315 | 16,023 |
| 27. Albert | C. | 6.61 | 459,071 | 69,451 |
| 28. Hopetoun | W. | 6.43 | 76,337 | 11,872 |
| 29. Russell | S.E. | 6.35 | 151,771 | 23,901 |
| 30. Herbert | U.N. | 6.33 | 52,678 | 8,322 |
| 31. Buccleuch | S.E. | 6.26 | 282,082 | 45,061 |
| 32. Carnarvon | C. | 6.01 | 10,061 | 1,674 |
| 33. Cardwell | S.E. | 5.91 | 22,830 | 3,863 |
| 34. Dufferin | W. | 5.89 | 58,458 | 9,925 |
| 35. Newcastle | U.N. | 5.88 | 135,587 | 23,059 |
| 36. York | W. | 5.79 | 5,859 | 1,012 |
| 37. Manchester | W. | 5.71 | 634 | 111 |
| 38. Way | W. | 5.42 | 425,519 | 78,509 |
| 39. Young | L.N. | 5.20 | 29,089 | 5,594 |
| 40. Kintore | W. | 4.99 | 113,677 | 22,781 |
| 41. Blatchford | U.N. | 4.73 | 39,557 | 8,363 |
| 42. Glanville | U.N. | 4.22 | 63,549 | 15,059 |
| 43. Hanson | U.N. | 4.16 | 84,693 | 20,359 |

Thus, then, over 14½bush. in County Grey, and under 4¼bush. in County Hanson, represent respectively the extremes in our county wheat averages between 1906 and 1916. It is evident, therefore, that even in our most fertile and earliest settled districts we are not yet within sight of the maximum State average that climatic conditions would appear to permit of. At the same time, apart from a few exceptions, the Counties of the Central, South-Eastern, and Western Divisions must tend automatically, and without any very special effort of their own, gradually to improve their wheat-yielding position as normal farming practices become general over the newly settled area. Enhancement in yields in the Lower North, on the other hand, and in some of the older settled Counties in other Divisions, must depend very largely in future decades on improved methods, and perhaps, too, on the reduction in area of individual farms. Finally, in the Upper North, apart from Counties Frome and Dalhousie, rainfall conditions are, on the whole, far too uncertain to render probable any very material improvement in decennial average yields.

### AVERAGE WHEAT YIELD ON ROSEWORTHY COLLEGE FARM AND NEIGHBORHOOD.

We have now considered average wheat yields from the point of view of the State as a whole, from that of the large statistical Divisions, and from that of individual Counties. I propose next illustrating the position from the standpoint of an individual farm, with the general conditions of which I am perfectly familiar. I refer to the farm attached to the Roseworthy Agricultural College. On this farm harvest results have been noted and tabulated with great care for the past 12 seasons. From these data conclusions as to the agricultural possibilities of the district in which the farm is situated appear legitimate; and if speculative generalisations be admitted, these conclusions may perhaps be given even wider bearing. Long personal experience of the Roseworthy district, and tolerable acquaintance with the rest of the State, have led me to believe that both in the matter of climate and soil the Roseworthy Agricultural Farm represents very fairly the average agricultural conditions of South Australia. Hence I am inclined to believe that maximum average results in wheat yields obtainable on this farm are likely to represent the extreme limit beyond which climate and soil will not permit a State decennial average to rise.

Between 1904 and 1916 (12 successive seasons) the average area under wheat for grain on the College Farm was represented by 268 acres, and the average acre yield therefrom by close on 17½bush., with a maximum of 25.08bush. in 1909 and a minimum of 6½bush. in 1913. Clearly an average of 17½bush. is measurably less than the 20bush. which I believe to represent the true agricultural capacity of the district, and our extreme maximum in the way of future State decennial averages. In explanation of this apparent discrepancy, it should be stated that practically all College crops are handled for experimental purposes, and as such are not calculated, in many instances, to yield maximum returns. One example will perhaps serve to illustrate the position. Long experience has shown the types of wheat that are peculiarly adapted to College conditions; and yet, year after year, these types can only be allowed to occupy a more or less important fraction of the area sown, because of the importance of raising pure seed of various types for State purposes, and of testing, from time to time, on a large scale, new varieties which have shown promise in other districts. In these circumstances, although the maximum will be exceeded in favorable seasons, the College average wheat yield over an extended period of time cannot be expected to reach the possible maximum for the district, which should, in my opinion, be within the neighborhood of 20bush.

If now we turn to the district in which the College is immediately situated, viz., the District Council of Mudla Wirra North, we find that between 1904 and 1916 the average area under wheat was 8,122 acres, and the average acre yield 13.36bush., with a maximum of 24bush. in 1905, and a minimum of a little over 2bush. in 1914. This is an old settled district, chiefly a hay-growing one, it is true; but I confidently look forward to the time when its decennial wheat average will not be far short of 20bush. to the acre.

### INFLUENCE ON AVERAGE WHEAT YIELDS OF SOIL, CULTURAL METHODS, AND DISEASES.

I have already indicated the existence of other factors whose influence may tend to depress the maximum average yield which climatic conditions otherwise render possible. I propose now examining briefly each one of them.

In the matter of general soil conditions we have, I think, little to complain of relatively to the position of other countries. Good wheat land, it is true, is rightly described as "heavy land"; and given an adequate rainfall, land of this type will, no doubt, carry heavy crops of wheat. We have in this State land both light and heavy, although perhaps in point of view of total area the former tends to predominate over the latter. There is, however, sufficient local experience to show that our lighter types of soil carry wheat far more satisfactorily than might have been anticipated from the experience of moister countries; indeed, in many districts these light lands are the standby of the farmer in years of light rainfall. Fortunately, too, the bulk of our soils are more or less calcareous in nature, and therefore adequately stocked with lime, whilst we have learnt to meet their almost universal low tenor in phosphoric acid by the intelligent use of phosphatic manures. In brief, then, there is nothing in the character of our soils to lead us to modify any estimate of possible State averages based on a consideration of climatic conditions.

The influence of cultural methods and practices must evidently be very great at all times; and our present relatively low averages are partly the natural consequence of unavoidable pioneering methods. There can be no doubt, on the other hand, that if we are ever to attain to the maximum averages that climate and soil permit of we shall have to fall back upon methods of cultivation more in keeping with intensive farming operations.

Of diseases and pests, so far as we are at present aware, red rust alone is really to be feared; and even in the latter case we have reason to believe that in the course of time localised varieties will acquire a considerable degree of immuneness against rust. It is true, of course, that the various smuts, take-all, &c., have in the past taken annual toll from our crops; and they will probably continue to do so in the future. It is nevertheless a fact that losses from these diseases would, on the whole, be infinitesimal did we but adhere strictly to rational lines of prevention or treatment. Here, again, if we except perhaps occasional serious outbreaks of red rust, which we hope in time to be able to control, I see no greater danger to our future decennial State averages from the action of diseases and pests than obtains normally throughout the world in other wheat-growing countries.

### INFLUENCE OF ECONOMIC CONDITIONS ON AVERAGE WHEAT YIELDS.

And, finally, there is the incidence of economic conditions. A detailed examination of the latter would involve us in questions of exceptional intricacy, nor can it be undertaken. The general bearing of these conditions is, however, simple enough. Thus it may be said in summary, that however much climate, soil, and efficient technical practices may combine to render possible certain agricultural results, the latter must remain nugatory unless general economic conditions allow of their being achieved at a profit to the landowner. Hence, in ultimate analysis, the farmer's interest in economic conditions is represented by the cost of production on the one hand, and prices realisable for his produce on his farm on the other.

Now, I think that in spite of our natural tendency to grumble, we shall have to admit that, on the whole, over the past decade economic conditions were generally, if not abnormally, favorable to the farmer. Indeed, we cannot escape the admission unless we wish to assert the practical bankruptcy of the farming community. It may, it is true, be argued that but for the timely aid of various side lines, wheat growing alone would not have proved profitable; but even if we should accept this view—and it is unquestionably correct in some instances—it cannot be said to invalidate the original argument. Indeed, it may be insisted that only in the initial stages of settlement of a new country can wheat growing alone be followed as a profitable occupation; that we have outgrown this stage; and that in present circumstances the farmer, whilst retaining wheat as his main objective, must combine with it other lines of activity; and the latter, far from embarrassing his main crops, will probably serve to strengthen their economic position.

We have in the present condition of the British Isles a very clear-cut example of the results on wheat growing of unfavorable economic conditions. In 1874 the area under wheat in the United Kingdom was represented by 3,819,011 acres, whilst between 1908 and 1912 the average yearly area was only 1,859,836 acres, a decrease of close on two million acres, or over 51 per cent.; and this may be represented as the direct consequence of the free competition of foreign wheat, a very important economic factor. Those who wish to argue against the local profitableness of wheat growing, should not forget that over the last decade the area under wheat in South Australia increased at the average rate of 25,000 acres per annum; and that in no earlier decade was the extension of the area so marked.

I shall assume, therefore, that between 1906 and 1916, with average yearly yields of 9.85bush. per acre, economic conditions were not unfavorable to the local wheat grower. Over the same period the average Port Adelaide price for wheat was about 4s. 2d. a bushel (including the exceptional average price of 7s. 3d. a bushel which obtained in 1914-15). This figure, of course, does not represent the average price realised by the farmer; allowance has still to be made for the average cost of conveying the grain to the seaboard, which, for general purposes, may be taken to be represented by 3d. a bushel. We may conclude, therefore, that the average price realised by farmers in the last decade was about 3s. 11d. a bushel; and with an average yield of 9.85bush., this would represent an average gross return of 38s. 7d. per acre.

What, on the other hand, has been the average cost of production? I have seen this variously estimated; and even in one and the same district no two estimates appear to be in complete agreement, probably because in such questions the personal factor is still of supreme importance. In the circumstances, therefore, I shall not attempt to put forward any new estimate purporting to represent the average cost of production of wheat for the whole State. Unless, however, we are inclined to put in doubt the solvency of the community, we are bound to agree that this cost of production in the preceding decade must have been below 38s. 7d. per acre, or at all events not in excess of it. In the first case, wheat-growing will have left to farmers an annual profit which will have varied with circumstances; in the second one, it will at all events have assured them fair wages in a congenial occupation.

In conclusion, therefore, if relatively to other countries our average yields of wheat are still low, so also is our average cost of production. Nor should it be overlooked that we cannot hope to increase these yields in the decades that are before us without incurring corresponding increases in our general expenditure. Ultimately, no doubt, we shall come under the influence of the law of diminishing returns, and we may even have to realise that certain increases, however attractive, are too costly to be economically sound. We are, however, as yet, many decades distant from any such contingency.

### FACTORS THAT LEAD TO BETTER YIELDS.

From the past and its achievements we must now turn to the future and its anticipations, and I suppose that without exception we all believe that between 1916 and 1926 our decennial State wheat average will continue its progressive rise. In this connection I propose now examining briefly various factors which should in my view lend a helping hand towards that end.

### COMPLETE RECLAMATION OF NEW LAND.

The factor from which we may expect most—because of the certainty of its incidence—is the gradual reclamation of recently cleared land which has within latter years been put under crop. It is worth noting that between 1907 and the present time close on two and a half million acres of scrub land have been cleared, and from time to time put under wheat. Now we all realise that in referring to areas of this kind as "cleared," and notwithstanding the crops they have been made to carry, we do not wish to imply that the land in question has been completely reclaimed to farming purposes. It grows wheat, it is true; but with it mallee shoots as well; and even when the latter have been completely eradicated, their underground stems and surface roots continue for many years to hamper normal farming operations, and to be reflected in crop yields which are certainly below a reasonable normal average. And since in this State mallee land covers a very appreciable proportion of our farming areas, it is not until all this land has been completely and thoroughly reclaimed that we can hope for a high all-round State wheat average.

Unfortunately the methods of the average mallee farmer are not generally calculated to hasten on this desirable end. It is not my intention, however, to discuss these methods at any length to-day. I freely admit that the mallee would never have been touched within our time had not some such rough and ready treatment as rolling and burning been devised. What I do feel, however, is that the period of definite reclamation is as a rule unduly prolonged, and that at times so long is the process that scrub practices become part and parcel of the mallee farmer's nature, and that in the end he is unable to understand farming apart from a constant struggle with roots and shoots. Needless to add that in such circumstances it is not easy to secure very satisfactory average yields.

The gentle art of criticism and advice giving is easily indulged; its helpfulness, on the other hand, is often marred by the inability of the critic to project himself mentally into the other fellow's place. Undoubtedly at Roseworthy I had many years' farming experience of mallee land, and am, therefore, able to judge of its ultimate agricultural possibilities; unfortunately, however, my personal experience has never extended beyond land which had already been cleared by others; hence, it is perhaps difficult for me to form a true mental picture of what a daily struggle with virgin mallee really implies. I am, however, sufficiently acquainted with facts to know that with the average mallee farmer it is not so much a question of good or bad farming as one of individual finance, and that in attempts at its solution the struggle to keep body and soul together is often sufficiently intense to render the means employed more or less a matter of indifference. It is, therefore, with a full knowledge of my shortcomings as a critic that I submit for consideration the following propositions relative to the handling of mallee country and the future thereof:—

1. In present economic conditions preliminary rolling and burning is the only practicable way of winning over the mallee to normal farming.

2. But not until they have been completely freed of roots and shoots will mallee farms reach their maximum wheat producing and grazing capacities.

3. Undue length in the reclamation period, or an attitude of "live and let live" towards the mallee, is not only costly to the holder, but the fruitful source of slovenly practices, which it will take years, if not generations, to overcome.

4. In the mallee, as elsewhere, fire is an excellent servant, but an undesirable master. In the early stages of reclamation the mallee farmer cannot do without his services; but failure to dismiss him at the earliest opportunity implies indifference towards complete reclamation, which should be the chief aim of the conscientious settler.

5. It is not denied that "firing" some types of virgin land has apparently a stimulating influence on the present crop producing

capacity of the latter. As such, however, "firing" represents no more than a short cut to results which may be attained more slowly, it is true, but at less expense to ultimate fertility, by good honest ploughing.

6. A long reclamation period implies repeated "firings"; the growing of crops year after year on the same ground; the gradual invasion of the land by weeds; the inevitable spread of takeall and smut, &c. And the only sure cure to difficulties of this nature is the complete eradication of shoots and roots as soon as this becomes economically possible.

7. The mallee farmer is unwise, indeed, who measures his progress by the square miles of country he has been able to roll and burn; infinitely more profitable are 100 acres thoroughly reclaimed than an area three or four times as great on which wheat and mallee wage an unequal contest. And I look upon any legislative measure which compels the new settler to level down yearly a given area of virgin country, whatever the means at his command, as conceived in the interest neither of the settler nor of the State.

### IMPROVEMENT IN YIELDS OF SETTLED DISTRICTS.

But if wheat yields are certain to increase almost automatically over those areas of country but recently under scrub, we cannot entertain the same certain hope where older settled land is concerned. And yet we have to face the fact that yields such as 13bush. or 14bush. to the acre in old settled counties like Light, Stanley, or Victoria are very far from satisfactory. Indeed, we know that in these selfsame counties the averages of many and many a farmer are not far from double these figures. The inference then is that, whilst we have many excellent farmers in our midst, there are others, on the other hand, whose methods might, with a little good will, be improved upon to the great advantage of the State. As likely to help in this direction, I summarise below a few propositions with some of which you will probably agree.

#### *Influence of Education.*

1. The unsuccessful farmer, or at all events the farmer whose success is not equal to his opportunity, is depriving the State of the enjoyment of some portion of its natural wealth. Hence, apart from questions of good fellowship, his more successful neighbors have a direct interest in him and his doings. Let them get him to join a branch of the Agricultural Bureau in the hope that an interchange of ideas with his fellows may lead to the practical appreciation of better methods. The first step towards progress, therefore, is essentially educational in character, and I realise that in this direction the Department of Agriculture shares an equal responsibility with the progressive farmers of the State.

### *More Thorough Tillage.*

2. From the point of view of high average State yields, our greatest weakness lies probably in the direction of soil tillage; and it is natural that this should be so. We are still pioneer settlers of vast areas of land; we are still holders of larger areas than we are able individually to exploit, because as a rule we cannot command the necessary capital thereto. And it follows that the man whose means admit of cropping well, say 200 acres, slurs over his tillage when he attempts to handle 400. And unfortunately at times both season and results appear to justify him in his action. Who has not heard of the man who scratched in a second crop and reaped quite as good results as his neighbors from well-worked fallow? Nevertheless, if we take the general average, we shall find that it is good honest tillage that counts in the long run, and that it is the man who systematically attempts to put in more than his means admit of who is largely answerable for our low State yields. Better far that he should sell half of his land and utilize the proceeds towards increasing his working capital.

Our tillage operations usually lack thoroughness and the characteristics of a workmanlike job. In the hands of an expert spade work approaches the ideal in soil tillage. On the farm no doubt the spade has long been dead, and I am not advocating its resurrection, except perhaps as evidence that kitchen gardens, flower gardens, and orchards are to become more common on our farms than has hitherto been the case. I mention the spade, however, because it should be the aim of good plough work to approach the ideal as nearly as possible. In ordinary circumstances, however, what, as a rule, do we see? A tendency to reduce directing man power to a minimum; to multiply furrows indefinitely; to reduce furrow widths to an often ridiculous minimum; to endeavor to work with a fraction of a horse to a furrow; and to cling tenaciously to unwieldy stump-jumping implements, simply because they were indispensable in days gone by. And unless the field be of billiard-table levelness and of perfect evenness of texture the natural result is individual plough bodies working with glorious independence, some biting deeply into the soil, others sliding merrily over it or just below the surface; hence bad tillage, unavoidable unevenness in depth, hard patches that are no more than scratched over, furrow slices that are set on edge but not inverted, and a few weeks later the field as green or as yellow as if a plough had never been near it. And, above all, we have a horror of driving our ploughs deeply into the ground, and thus deprive ourselves voluntarily of one of the simplest ways of getting at the natural wealth that lies stored beneath our feet. I do not wish to imply that these strictures apply to the whole farming community, or even to the majority of us; it is sufficient, however, that an important minority should deserve them to see their influence reflected in a relatively low State wheat average.

Less fault can be found with subsidiary tillage operations, such as cultivating and harrowing, which usually complete the work of the plough. I should like to point out, however, that apart from exceptional cases of very cloddy land, rollers appear to be entirely overlooked by us as necessary tillage implements, and if availed of at all are usually too light to be really effective. And yet, if we could but realise it, whether the land be light or heavy, rollers can be made to do very profitable work in the way of preparing the land for wheat; particularly is this the case for land broken up late in the season. In my view all land intended for wheat and broken up after July rains should be heavily rolled as early after ploughing operations as possible—at harvest time the value of this treatment may be measured in bushels.

### *Phosphatic Manures.*

3. In any assessment of the factors that have led to local improvement in the agricultural outlook, it cannot be said that we are prone to overlook the part played by manures; and whilst I will not go so far as to say that we over-estimate the latter, I am satisfied that we often under-estimate the value of improved tillage methods. Whatever may be said on this score, however, there is no denying the extraordinary success of soluble phosphatic manures in South Australia—of them, relatively to the rate of progress usual in other agricultural reforms, it may almost be said that they came, they were seen, they conquered. In 1897 about 2,000 tons of artificial manures were used in South Australia; in 1914, *i.e.*, 18 years later, the quantity used had risen to over 97,000 tons. The extraordinary progress effected in so short a period of time is all the more remarkable in that it involved a radical and costly change in seeding practice, namely, the substitution of the seed-drill for the broad-caster. It was only a few years earlier—in the late eighties—that the first Principal of the Roseworthy Agricultural College, Professor Custance, who was at the time endeavoring to impress the value of the seed-drill upon South Australian farmers, was caustically advised to place it in the College Museum, as an ancient relic of historic interest, no doubt, but of no possible practical value.

But if farmers, as a class, are unquestionably very much alive to the importance of superphosphate in South Australian farming, nothing like unanimity exists as to the dressings that can be applied to best advantage. Light dressings of superphosphate—at times as low as ½cwt. to the acre—have frequently given rise to very striking results; hence naturally a rather general tendency to restrict the average dressing to the smallest quantity possible. And the general result to-day is, I think, that farmers as a whole dress their wheat fields with smaller quantities of superphosphate than is their personal interest to do—in other words, an all-round increase in the quantity of superphosphate used would almost instantaneously lead to an appreciable rise in our general State wheat average.

I have already admitted that some increases in yield can be bought at too high a price; that if, for example, the cost of the additional manure used should exceed the market value of the average crop increase, there could certainly be no advantage in the use of heavier dressings of superphosphate. It must be admitted that in this connection the general position is complicated by economic considerations; thus, variations in prices of wheat and manure respectively are not necessarily compensating; similarly, an increase in crop which is profitable with wheat at 4s. a bushel may not be so with wheat at 3s. 6d. Fortunately, however, from the point of view of his livestock interests, the indirect benefits to the farmer of heavy dressings of superphosphate are so great that one can safely recommend them so long as crop increases just about balance the cost of the additional quantities of manure used.

It must be agreed, however, that absolute uniformity in the matter of dressings cannot be expected over a vast extent of country such as our own, and in matters of this kind it must be left to each district gradually to develop its own line of policy. Personally, I am perhaps rather inclined to lean on such experience as I was able to acquire at Roseworthy. Fortunately, however, we now have several Government farms, distributed over different portions of the State, and from the experiments that are being conducted on them I am endeavoring to realise the position from the point of view of the districts in which they are placed. I may be permitted to repeat here that at Roseworthy I found a 2cwt. dressing of superphosphate more profitable than lighter dressings, and I made it the standard dressing of the farm. I believe that the indirect benefit on pasture of this rather heavy dressing has been evident to all those who have visited the institution within recent years. On the other hand, dressings of superphosphate in excess of 2cwt. to the acre were hardly ever profit-bearing at Roseworthy. Such, then, was our experience in one district, and whilst I do not wish to maintain that it is likely to be confirmed over the length and breadth of the State, I believe, nevertheless, that it will be found to hold good over many thousands of acres which are at the present time far too lightly dressed.

The fear often expressed that dressings of superphosphate heavier than those one has been accustomed to are likely to lead to blighting off in the crop, is in my experience without foundation, and I have made consistent use of very heavy dressings indeed. As a matter of fact, undue rankness in the crop, which as a rule is one of the contributing causes to blighting off, is not so much brought about by the action of the superphosphate as by the peculiar characteristics of the season itself and their reaction on the natural fertility of the soil. The only type of soil on which the action of acid superphosphate is to be feared is light soil insufficiently supplied with lime. In soils of this character phosphatic manures, if required, should be supplied in neutral form like basic slag; or, even in districts of heavy rainfall, like finely ground untreated phosphatic rock, or again like bonedust.

### *Other Types of Manures.*

4. From the point of view of general farming, phosphatic manures appear to be the only ones in which any interest is at present being taken in South Australia. And yet there is no doubt that in many special cases other types of manures are destined to exercise an important influence on the upward tendency of our future State wheat averages. Thus, even at Roseworthy, where the rainfall is not heavy, we have been able to prove that nitrate of soda, when used jointly with superphosphate, if not actually profit producing, has a very distinct influence on the yields of crops. Over a period of nine years the average increase noted for the use of 1cwt. of nitrate of soda and 2cwt. of superphosphate to the acre, relatively to 2cwt. of superphosphate alone, was about 3bush. of wheat and about 5cwt. of hay. Improvement in yield is therefore undeniable. Unfortunately, however, at the prices that have hitherto obtained for both produce and manure these increases in yield are hardly profit bearing. And whilst I feel certain that equally unsatisfactory results would be secured over the bulk of the State, it does not follow that we have no districts in which nitrate of soda could be used to some advantage. It is quite probable that this type of manure could be used profitably in many of our damper districts wherever the soil is open and porous. Again, the main objection to nitrates—and with them in this connection may be associated sulphate of ammonia—is what appears to me as their unnecessary costliness, namely, not less than £14 a ton at pre-war rates. Within comparatively recent times nitrates have been manufactured fairly extensively from the air, and it is to be hoped that as manufacturing methods improve, it will be possible to place them at the disposal of farmers at far lower prices than have hitherto obtained.

Potash manures have in the past been equally costly; fortunately, however, both our heavier and medium types of soil are so heavily stocked with available potash that from the point of view of most crops potash manures are more or less without appreciable effect; and this is notoriously the case for all cereals. On the other hand, it is quite possible that over some of our lighter types of soil—and of these we have vast areas—potash manures may eventually prove very useful. Any extensive use of them, however, is possible only on an appreciable reduction in prices hitherto asked.

Lime, again, our soils are as a rule amply stocked with; there are, however, a few striking instances of lime deficiency, which, unless adequately met, will condemn soils affected by it to very unsatisfactory wheat yields. The wider use of the practice of liming in our South-Eastern Division, and in much of the country south of the Murray, will help much towards improving the wheat yields of these districts.

### *Organic Matter.*

5. And, lastly, we must consider the influence on wheat yields of the organic matter or humus of the soil; the consideration of such a question would appear almost superfluous in virgin agricultural country such as our own. Circumstances, nevertheless, are such that we are already unable to overlook it in any discussion relating to the successful growth of almost any type of crop. It may be said, in a general way, that local farming practices deliberately, albeit unconsciously, aim at the destruction of the organic matter in the soil; to treat land as well worked bare fallow for a period of nine or ten months in alternate years implies the slow destruction of enormous quantities of organic matter which past centuries have accumulated in the soil. True, we reap the benefit of this destruction in an appreciable increase of the present fertility of the land. This improvement, however, is made at the expense of future crops; and unless we are prepared to make good the loss, our average wheat yields after a while will tend to decline rather than to increase. There are various ways in which this difficulty may be overcome; of these, however, only one, in present circumstances, is of real practical interest to us; and, fortunately, it is well within the reach of most South Australian farmers. It may be stated, in principle, that the greater the proportion of livestock relatively to area carried by a farm, the greater ultimately its acquired fertility; in other words, grazing, reasonably handled, instead of impoverishing the land, adds to its agricultural value; and this chiefly because it tends to replace organic matter destroyed in the course of tillage operations.

We see, therefore, that crop raising, on the one hand, and livestock handling on the other, react reciprocally and favorably one on the other. Crop raising, if accompanied by heavy dressings of phosphates, leads eventually to stronger and richer pastures, and hence to improved stock-carrying capacity. An improved stock-carrying capacity results in a greater accumulation of organic matter in the soil, which, in its turn, if judiciously handled, means as a rule heavier crop yields.

We may infer, therefore, that the stress of economic conditions which is gradually driving the South Australian farmer towards livestock operations, must in the end react favorably on his cropping returns, and eventually lead to a higher State wheat average.

### *Seed Wheat.*

6. And, finally, as calculated to influence future State wheat yields, I shall mention improvement in the type of seed wheat usually sown. It may be admitted that within recent years many farmers have shown laudable anxiety to secure for their purposes the best type of seed wheat locally procurable; on the other hand, there are others whose concern does not as a rule go beyond the name of the variety which they propose growing. One may, I think, judge of the extent to which the importance of this question is really appreciated by the money value which the average individual is prepared to place upon good seed. It can hardly be maintained that the man who sees no difference in intrinsic value between an f.a.q. sample and good seed wheat knows what good seed wheat is, or what it costs to produce; and yet I have heard views of this kind solemnly put forward by reputedly competent judges. I am afraid that this question of seed wheat is involved in many important issues which I cannot undertake to pursue in detail in the present address. I shall have to confine myself, therefore, to summarising the chief of them in the form of a series of brief propositions.

(*a*) The first essential of good seed wheat is that the variety sown should be pure and true to name, and well adapted to local conditions of climate and soil.

(*b*) There is no particular virtue attaching to the mere act of a change of seed; the careful farmer can, as a rule, raise better seed on his own farm for his own purposes than he can secure from his neighbor.

(*c*) Whilst a progressive farmer may be willing to test on a small scale new varieties apparently adapted to local conditions and well spoken of elsewhere, it is never wise to rush these new varieties in a wholesale manner at the expense of old and well-tried ones. Those that prove unsatisfactory on a small scale are not likely to prove satisfactory on a large one.

(*d*) All varieties of wheat, unless under the influence of more or less continuous selection, tend to fall back to a fixed dead level of mediocrity, which is naturally fatal to high average yields.

(*e*) We may agree that the regular business of selection on a large scale should be left to experts, who are able to concentrate their time and energy upon the work. Nevertheless, just as the careful farmer leaves the breeding and selection of his rams to the highly trained studmaster, but himself selects his breeding ewes, so the wheat grower is able on his own farm, if he wishes it, to continue on a lower plane the more delicate work of the expert wheat breeder.

(*f*) The farmer who aims seriously at selection work should confine his attention to two or three varieties, at the outside; to take up a greater number would mean, as a rule, dispersal of effort and lack of results.

(*g*) It is as well to realise that selection by "roguing" undesirable plants from a patch of wheat, however small, is never satisfactory, and cannot in any sense be classified as selection work.

(*h*) The only satisfactory method of selection consists in taking as a starting point a single plant of conspicuous all-round merit, or the best ear from such a plant, or, preferably still, individual grains in the best ear of such a plant. Any one of these taken as individuals may be made the starting points of selected strains; and if—as should be done—the connection between them and succeeding generations is retained, we shall have not only selected strains, but pedigreed selected strains.

(*i*) A small number of rows placed in the middle of a field can in each year be made to carry conveniently all the plants that are subject to direct selection. At harvest time the best plants in these rows supply seed for next year's selection operations, whilst the balance of their grain can be sown in the ordinary way, and trusted to supply in the following year sufficient seed for a fair-sized field. Practices of this kind, continued from year to year, constitute in the long run automatically continuous selection.

(*j*) All farmers cannot and will not take up work of this kind. The man, on the other hand, who is willing and able to do so will have no difficulty in making his value felt in his district; in the end it is probable that all his grain will be disposed of to his neighbors in the form of seed wheat, whilst the task of building up the local f.a.q. sample will fall to others.

(*k*) But if every farmer cannot practice regular selection on the lines described, there is not a farmer who cannot grade his wheat if he sets his mind to it. The advantages of sowing graded seed wheat are many, and cannot, I am afraid, be enumerated here. I believe, however, that most farmers recognise the value of the grader, and would make use of it freely were it not, when of satisfactory pattern, a relatively expensive machine. We have here a case in which co-operative action seems clearly advisable. There is nothing to prevent several neighbors joining together in the purchase of one grader, and grading their seed wheat at leisure over the long interval which separates harvesting from seeding operations.

(*l*) Finally, let us insist that good seed wheat is not the same as a good f.a.q. sample. It is wheat that is true to name, that has some sort of recognised pedigree; that is reasonably free from injurious weeds; that consists of well-developed plump grain, from which both shrivelled and broken grain has been carefully removed; and, finally, that has not suffered from exposure to weather. A shilling a bushel above f.a.q. rates is not too much for a sample that complies with all these conditions.

To the extent that these principles receive fuller recognition in the practice of the average farmer, so will they tend to exercise a favorable influence on the State wheat average.

### *Harvesting Operations.*

7. I must refer briefly to one more factor, likely to bring about, however, not so much an actual as an apparent increase in yields. I refer to our harvesting methods. Personally, I am of the opinion that the combination of binder and thresher, besides accumulating much valuable straw, will gather in appreciable quantities of grain which neither stripper nor harvester can, in ordinary circumstances, reach; and it follows that if the former could be substituted for the latter over our harvest fields on anything like an appreciable scale, there would unquestionably be an apparent increase in the State yield. The retort of course is possible that the grain saved by this change of method may be purchased at too great a cost; and whilst I admit that the point is debatable, I believe personally that the grain would be saved at a profit both to the farmer and to the State. The real difficulty lies in the paucity of labor at harvest time; but in this connection what is a real difficulty for the individual can be solved readily enough by a combination of individuals. I see nothing to prevent a combination of farmers threshing their own crops in common with a threshing gang visiting each farm in rotation.

Personally, I cannot look upon the complete harvester as the last word in the way of South Australian harvesting machinery. My predecessor, Professor Lowrie, held similar views on the subject, and once described to me an alternative which appears to me to have practical worth. He pointed out that to drag over a rough field, up dale and down dale, from one end of the day to the other, a complete reaping and threshing plant is, on the whole, a very costly and cumbersome practice. In lieu of it, he suggested that the ears of the wheat plant could be cut off short, as is already done by the reaper-thresher, and received into a box, but not threshed. From this box the ears could be conveyed to a corner of the field or to a barn, where, after drying, they would at leisure be put through a very simple threshing machine and handled with comparatively little labor. It may be that future improvements will tend in this direction; but whatever their ultimate direction, they will always lead to better State wheat averages if they help to remove the crop at an early date from unnecessary exposure to summer storms and winds.

### CONCLUSION.

In conclusion, I feel that I should apologise for my address, because I know that I have not been able to concentrate into it all I intended conveying. During the last few months I have found on my hands many unexpected tasks, and it is only brief and scattered intervals that I have been able to give to the preparation of my Congress Address. Hence, it is to be feared that it has grown cold on the anvil, and has not altogether taken the shape originally intended for it. I trust, however, that it will have had the effect of making clear to you the real progress of the past decade, on the one hand, and how much still remains to be done, not only by ourselves, but by our descendants as well, on the other. We often hear it said that in South Australia new land is more or less exhausted, with the unspoken inference that stagnation lies ahead of us. Personally, I take quite other views, and believe that the sooner we exhaust available new country the better will it be for us as a farming community. It cannot be said that in the past South Australia has been farmed, in the proper meaning of the term; for the most part we are a restless, more or less nomadic community, content to skim off the virgin cream of the land, and pass on to a new selection. Practices such as these are fatal to progress, and in my view the sooner temptation, in the shape of new land, is withdrawn from us, the sooner we shall attain to a State wheat average worthy of our grit, commonsense, and intelligence.

(*To be continued.*)

# THE AGRICULTURAL OUTLOOK.

## REPORT FOR MONTH OF NOVEMBER.

The following reports on the general agricultural condition and outlook of the areas represented by the Government Experimental Farms mentioned below have been prepared by the respective managers:—

*Eyre's Peninsula.*—Weather—Rough weather has been predominant thoughout the month, combined with mostly cool conditions with strong west and south-west breezes, interspersed with thundery and stormy conditions from north and north-west. Over 1in. of rain has fallen, which has helped materially to improve the later wheats and oat crops. Crops.—In some cases Gluyas has been unable to withstand the weather conditions, and is laid badly. Red rust has developed rather strongly on a few of the more protected parts of crops. Early wheats are ripening irregularly, some patches being ready for the stripper, whilst others are yet soft and greenish. Natural feed is dying off, and grass seeds are plentiful. Rust has been noticed badly affecting some of the native grasses. Stock.—Horses that have been on the natural feed are fat, in fact rather too fat for fast harvesting work. Pests.—Cockatoos and parrots are congregating on the ripening wheat, and saving the harvesters some work.

*Booborowie.*—Weather—This month the weather has been noted for its coldness and the quantity of rain that fell, not a week passing without a good rain. Frosts have been prevalent. Several very severe thunderstorms occurred during the last week. Crops have been greatly benefited during this month by the rains, and great improvement is shown, especially in the stubble crops; the yields should be very heavy. Natural Feed—There is plenty of good natural feed, the grasses having been kept green by the late rains. Stock are in first class condition, and very free from illness. Pests—Grubs have again made their appearance in the lucerne, and are doing damage. Miscellaneous—Haymaking will be started shortly; much lucerne has been cut for hay.

*Kybybolite.*—Weather—The weather has been very unseasonable, the 328 points of rain registered being 174 points in excess of the average for the month. The rain has generally been accompanied by hail and strong winds. Crops are generally satisfactory, and still promise a good average yield, but on account of the cool wet conditions are somewhat late in maturing. Haycutting will not be general for at least a fortnight, and then only if summer conditions are experienced in the meantime. Oat crops that were at all rank have lodged badly, but no other crops have been affected by the rough weather. Natural feed has gone to seed; much benefit will be obtained this year from a big seeding on most pastures. Stock are improved, and their condition ranges from good to fat. Shearing has been delayed by the rains, and is not yet completed. Pests—The Rutherglen fly has again been noticed in the district. Miscellaneous—Fallowing is still possible, and is being continued by some; the cultivation of fallow is also in progress.

*Turretfield.*—Weather—The month of November was remarkable for its abnormal weather conditions. Instead of dry and warm weather, heavy falls of rain were experienced, the total for the month amounting to 335 points, and, in addition, the temperatures were more like those of July and August rather than November. Crops—With heavy winds and the ground more or less in a sodden condition, farmers were rather anxious concerning their crops, but although some crops have been flattened to the ground in places, the amount of damage done is not great. The last fall of 61 points, registered on the 25th, did more damage in this respect than all the others put together. Haymaking has of course been greatly interfered with, and owing to the suddenness of the downpours of rain farmers were at times unable to stook the sheaves, which were consequently at the mercy of the weather. So far there has been no sign of red rust in the wheat crops. Natural feed is still abundant, and owing to the wet and cool weather is not drying off so quickly as is usual at this time of the year. Stock are keeping well and in good condition. Sparrows and starlings are very numerous. Owing to the cool and wet weather the cultivation of the fallow paddocks has not been so effective, as a fair proportion of the weeds is starting again when rain falls immediately after cultivation.

*Veitch.*—Weather—Two hundred and four points of rain have been recorded for the month. Veitch average, 93 points. A few windy days have been experienced during the past week. Crops all look well and are making a splendid head. Some of the weak strawed varieties are inclined to go down. Natural feed good. Stock all in marketable condition. Pests—Nothing troublesome. Miscellaneous—Haymaking operations are nearing a finish, and a large quantity has been made in this district.

## DAIRY AND FARM PRODUCE MARKETS.

A. W. Sandford & Co. Limited, report on 1st December:—

Butter.—Extremely favorable weather again ruled throughout the month of November, and this State continues to have a substantial surplus over local requirements, which is finding its way to the London market, where excellent prices continue to rule. This applies not only to factory butters, but to milled dairies, which last-named have very substantially improved in value since a month ago. Local rates for butter in prints at the close of the month, in accord with the Federal proclamation, were:—"Alfa," 1s. 4½d.; "Primus," 1s. 4d.; choice separators and dairies, 1s. 2½d. to 1s. 3½d.; store and collectors', 1s. 1d. to 1s. 1½d. per lb.

Eggs.—Substantial consignments arrived throughout the month, and on the whole, parcels came to hand in excellent condition. Values remained extremely steady until the last week in November, when prices here, in sympathy with the advanced rates in the eastern States, hardened a halfpenny. Considerable quantities were pulped, this material finding its way to the eastern States, as well as oversea. Quotations, loose, at mart, hen, 9¼d.; duck, 10½d. per dozen.

Cheese.—Record quantities have arrived from the factories, and yet prices have decidedly improved. Shipments to east and west have maintained, and rates are now 7½d. to 8½d. per lb. for large to smaller sizes.

Honey.—Market in this line is also firmer, values now being 3¾d. to 4d. per lb. for prime clear extracted. Beeswax finds ready sale at 1s. 5d. to 1s. 6d. per lb.

Almonds.—Odd lots have come to hand during the month, and been easily disposed of at advanced prices. Brandis, 10d.; mixed softshells, 9d.; hardshells, 5d.; kernels, 1s. 7d. per lb.

Bacon.—Much heavier quantities of bacon were received during November, and rates are in consequence not quite so strong as those ruling a month earlier. Best factory-cured sides, 11d. to 1s. per lb.; hams, 1s. 1d. to 1s. 3d. per lb.

Live Poultry.—Extensive catalogues of poultry have been submitted, farmers wisely sending in their surplus stocks. The trade are now operating in anticipation of Christmas requirements, and putting away in cold store, so that prices from now on are likely to be good, where quality is right. Good table roosters, 3s. 9d. to 4s. 9d.; nice conditioned cockerels, 3s. to 3s. 6d.; plump hens, 2s. 3d. to 3s. 3d., (a few coops of light sorts selling lower); ducks, 2s. 6d. to 4s. 2d.; geese, 5s. 6d. to 6s. 6d.; pigeons, 7½d. each; turkeys, from 8d. to 11d. per lb. live weight for fair to good table birds.

Potatoes.—The Adelaide market at present is being wholly supplied from the surrounding plains, where good crops are now being dug. Values have receded to the extent of £9 during the month. Onions.—There is no further demand for imported old ones, as supplies of local new ones are offering freely. Quotations:—Potatoes, £7 to £8 per ton of 2,240lbs. on trucks, Mile End or Port Adelaide. Onions, £6 to £7 per ton of 2,240lbs. on trucks, Mile End or Port Adelaide.

# RAINFALL TABLE.

The following figures, from data supplied by the Commonwealth Meteorological Department, show the rainfall for the month of and to the end of November, 1916, also the average precipitation to the end of November, and the average annual rainfall.

| Station. | For Nov., 1916. | To end Nov., 1916. | Av'ge. to end Nov. | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| FAR NORTH AND UPPER NORTH. | | | | |
| Oodnadatta | 0·57 | 8·46 | 4·33 | 4·76 |
| Warrina | 0·87 | — | — | — |
| William Creek | 1·01 | — | — | — |
| Coward Springs | 0·56 | — | — | — |
| Tarcoola | 0·47 | 6·12 | 7·25 | 7·58 |
| Hergott | 0·33 | 5·65 | 5·39 | 6·04 |
| Farina | 0·96 | 7·27 | 6·11 | 6·70 |
| Leigh's Creek | 1·30 | 7·30 | 7·83 | 8·66 |
| Beltana | 0·81 | 7·86 | 8·43 | 9·22 |
| Blinman | 1·08 | 11·25 | 12·00 | 12·83 |
| Hookina | 1·15 | 17·38 | — | — |
| Hawker | 0·99 | 17·57 | 11·36 | 12·22 |
| Wilson | 1·22 | 17·77 | 11·01 | 11·78 |
| Gordon | 0·79 | 13·28 | 9·63 | 10·26 |
| Quorn | 1·15 | 18·77 | 13·17 | 13·78 |
| Port Augusta | 1·15 | 10·55 | 8·95 | 9·46 |
| Port Augusta W. | 1·03 | 10·52 | 8·73 | 9·36 |
| Bruce | 1·26 | 12·02 | 9·57 | 10·01 |
| Hammond | 1·86 | 12·50 | 10·77 | 11·46 |
| Wilmington | 2·21 | 21·78 | 17·42 | 18·26 |
| Willowie | 1·89 | 14·56 | 11·30 | 11·90 |
| Melrose | 5·32 | 32·82 | 22·14 | 23·04 |
| Booleroo Centre | 2·80 | 19·11 | 15·83 | 15·83 |
| Port Germein | 2·44 | 10·72 | 12·11 | 12·84 |
| Wirrabara | 4·36 | 28·65 | 18·07 | 18·91 |
| Appila | 2·19 | 17·13 | 14·11 | 15·08 |
| Cradock | 1·27 | 10·81 | 10·18 | 10·86 |
| Carrieton | 1·49 | 14·90 | 11·34 | 12·22 |
| Johnburg | 1·37 | 11·37 | 9·46 | 10·21 |
| Eurelia | 2·33 | 15·99 | 13·24 | 13·24 |
| Orroroo | 1·97 | 15·75 | 12·70 | 13·42 |
| Black Rock | 2·10 | 14·98 | 11·49 | 12·25 |
| Petersburg | 2·74 | 16·55 | 12·22 | 13·07 |
| Yongala | 2·72 | 19·21 | 13·04 | 13·94 |
| NORTH-EAST. | | | | |
| Ucolta | 1·65 | 13·84 | — | — |
| Nackara | 0·71 | 10·68 | — | — |
| Yunta | 0·36 | 7·82 | 7·68 | 8·22 |
| Waukaringa | 0·46 | 9·08 | 7·36 | 7·94 |
| Mannahill | 0·42 | 7·87 | 7·83 | 8·46 |
| Cockburn | 0·49 | 9·59 | 7·45 | 7·97 |
| Broken Hill, NSW | 0·58 | 9·67 | 8·83 | 9·63 |
| LOWER NORTH. | | | | |
| Port Pirie | 3·38 | 17·20 | 12·55 | 13·21 |
| Port Broughton | 2·44 | 19·47 | 13·73 | 14·33 |
| Bute | 2·78 | 22·05 | 14·81 | 15·42 |
| Laura | 3·35 | 22·43 | 17·35 | 18·22 |
| Caltowie | 3·66 | 20·75 | 16·32 | 17·27 |
| Jamestown | 2·78 | 21·94 | 16·47 | 17·46 |
| Gladstone | 3·26 | 19·17 | 15·24 | 16·00 |
| Crystal Brook | 3·19 | 20·59 | 14·82 | 15·62 |
| Georgetown | 2·38 | 21·58 | 17·42 | 18·32 |
| Narridy | 1·93 | 16·86 | 16·00 | 16·79 |
| LOWER NORTH—*continued.* | | | | |
| Redhill | 1·56 | 21·13 | 16·07 | 16·79 |
| Spalding | 1·85 | 24·71 | 19·36 | 20·25 |
| Gulnare | 1·89 | 22·04 | 19·00 | 19·74 |
| BundaleerW.Wks. | 1·61 | 22·60 | 16·34 | 17·29 |
| Yacka | 1·41 | 18·96 | 14·56 | 15·27 |
| Koolunga | 1·90 | 19·87 | 15·11 | 15·94 |
| Snowtown | 2·88 | 23·89 | 15·06 | 15·70 |
| Brinkworth | 2·02 | 22·60 | 14·78 | 15·48 |
| Blyth | 2·74 | 22·26 | 15·63 | 16·34 |
| Clare | 3·78 | 32·74 | 23·37 | 24·30 |
| Mintaro Central | 3·74 | 33·97 | 21·08 | 21·99 |
| Watervale | 4·40 | 37·15 | 26·06 | 27·17 |
| Auburn | 4·86 | 28·62 | 23·27 | 24·25 |
| Hoyleton | 3·99 | 21·12 | 17·17 | 17·96 |
| Balaklava | 3·12 | 17·90 | 16·63 | 16·03 |
| Port Wakefield | 2·84 | 18·05 | 12·57 | 13·13 |
| Terowie | 1·62 | 15·18 | 12·72 | 13·71 |
| Yarcowie | 1·36 | 16·52 | 13·10 | 13·91 |
| Hallett | 1·45 | 17·17 | 15·50 | 16·40 |
| Mount Bryan | 2·13 | 24·38 | 15·05 | 15·73 |
| Burra | 2·25 | 24·52 | 16·99 | 17·82 |
| Farrell's Flat | 2·51 | 23·66 | 18·07 | 18·87 |
| WEST OF MURRAY RANGE. | | | | |
| Manoora | 3·88 | 24·97 | 17·17 | 18·09 |
| Saddleworth | 3·64 | 22·22 | 18·80 | 19·69 |
| Marrabel | 4·09 | 29·45 | 18·11 | 18·94 |
| Riverton | 4·88 | 28·34 | 19·68 | 20·48 |
| Tarlee | 3·69 | 22·00 | 16·66 | 17·48 |
| Stockport | 3·34 | 23·04 | 15·16 | 15·89 |
| Hamley Bridge | 3·06 | 21·22 | 15·61 | 16·45 |
| Kapunda | 4·48 | 26·97 | 18·78 | 19·67 |
| Freeling | 3·59 | 24·21 | 17·03 | 17·85 |
| Greenock | 4·77 | 22·14 | 12·44 | 21·46 |
| Truro | 3·46 | 27·62 | 18·84 | 19·74 |
| Stockwell | 3·95 | 27·00 | 19·33 | 20·30 |
| Nuriootpa | 4·01 | 31·38 | 20·20 | 21·25 |
| Angaston | 4·14 | 31·28 | 21·18 | 22·25 |
| Tanunda | 3·16 | 28·34 | 21·31 | 22·28 |
| Lyndoch | 3·86 | 28·01 | 22·07 | 23·01 |
| Williamstown | 3·51 | — | — | — |
| ADELAIDE PLAINS. | | | | |
| Mallala | 3·14 | 18·38 | 16·10 | 16·88 |
| Roseworthy | 3·92 | 21·96 | 16·53 | 17·31 |
| Gawler | 3·92 | 25·32 | 18·37 | 19·21 |
| Two Wells | 2·29 | 18·43 | 15·64 | 16·36 |
| Virginia | 3·76 | 21·71 | 16·77 | 17·58 |
| Smithfield | 2·89 | 21·47 | 16·54 | 17·30 |
| Salisbury | 3·78 | 24·33 | 17·81 | 18·57 |
| North Adelaide | 2·86 | 30·19 | 20·49 | 21·49 |
| Adelaide | 2·84 | 26·49 | 20·10 | 21·04 |
| Brighton | 2·53 | 26·25 | 19·02 | 19·93 |
| Glenelg | 2·20 | 23·27 | 17·52 | 18·35 |
| Magill | 4·37 | 26·76 | 24·53 | 25·69 |

## RAINFALL—*continued.*

| Station. | For Nov., 1916. | To end Nov., 1916 | Av'ge. to end Nov. | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| ADELAIDE PLAINS—*continued.* | | | | |
| Glen Osmond | 3·86 | 32·91 | 24·15 | 25·26 |
| Mitcham | 3·66 | 29·93 | 22·52 | 23·47 |
| Belair | 4·38 | 21·54 | 27·52 | 28·64 |
| Grange (Seaton) | 2·28 | — | — | — |
| Unley | 3·32 | — | — | — |
| Rose Park | 4·15 | — | — | — |
| Paradise | 3·54 | — | — | — |
| MOUNT LOFTY RANGES. | | | | |
| Teatree Gully | 5·32 | 32·94 | 27·01 | 28·19 |
| Stirling West | 5·60 | 54·16 | 44·88 | 46·70 |
| Uraidla | 5·23 | 53·83 | 42·59 | 44·35 |
| Clarendon | 3·65 | 36·28 | 32·26 | 33·67 |
| Morphett Vale | 3·08 | 26·78 | 22·36 | 23·32 |
| Noarlunga | 3·51 | 25·68 | 19·51 | 20 28 |
| Willunga | 3·63 | 30·25 | 25·07 | 25·98 |
| Aldinga | 2·72 | 24·04 | 19·47 | 20·34 |
| Myponga | 4·36 | — | — | — |
| Millbrook Reservr. | 5·04 | — | — | — |
| Normanville | 2·54 | 25·79 | 19·89 | 20·65 |
| Yankalilla | 3·26 | 40·95 | 21·91 | 22·78 |
| Cape Jervis | 1·72 | 15·99 | 15·71 | 16·34 |
| Mount Pleasant | 2·88 | 33·74 | 25·89 | 26·87 |
| Blumberg | 3·08 | 35·36 | 28·26 | 29·38 |
| Gumeracha | 4·20 | 38·59 | 32·01 | 33·30 |
| Lobethal | 4·74 | 44·53 | 34·13 | 35·38 |
| Woodside | 3·58 | 35·15 | 30·73 | 31·87 |
| Hahndorf | 3·58 | 35·26 | 34·16 | 35·45 |
| Nairne | 2·94 | 29·46 | 27·78 | 28·83 |
| Mount Barker | 4·15 | 37·35 | 29·76 | 30·93 |
| Echunga | 4·48 | 38·04 | 31·64 | 32·83 |
| Macclesfield | 4·25 | 36·29 | 29·64 | 30·72 |
| Meadows | 6·57 | 47·16 | 34·26 | 35·52 |
| Strathalbyn | 2·84 | 22·12 | 18·52 | 19·28 |
| MURRAY FLATS AND VALLEY. | | | | |
| Wellington | 2·88 | 17·41 | 14·25 | 15·01 |
| Milang | 3·90 | 16·48 | 15·44 | 16·08 |
| Langhorne's Brdg | 2·13 | 14·79 | 14·53 | 15·27 |
| Tailem Bend | 2·59 | 16·71 | — | — |
| Murray Bridge | 1·80 | 14·77 | 13·58 | 14·32 |
| Callington | 2·21 | 17·16 | 14·94 | 15·65 |
| Mannum | 1·33 | 13·76 | 11·14 | 11·67 |
| Palmer | 1·57 | 17·80 | 14·91 | 15·60 |
| Sedan | 0·79 | 15·65 | 11·33 | 11·92 |
| Swan Reach | 1·12 | — | — | — |
| Blanchetown | 1·01 | 9·43 | 10·06 | 10·71 |
| Eudunda | 3·72 | 24·52 | 16·44 | 17·33 |
| Sutherlands | 1·90 | 16·37 | 9·99 | 10·60 |
| Morgan | 1·87 | 12·06 | 8·57 | 9·29 |
| Overland Corner | 1·23 | 9·94 | 11·42 | 11·42 |
| Renmark | 2·28 | 12·60 | 10·93 | 10·93 |
| Loxton | 1·95 | 15·55 | — | — |
| WEST OF SPENCER'S GULF. | | | | |
| Eucla | 0·67 | 10·89 | 9·74 | 10·13 |
| White Well | 0·47 | 11·59 | 9·11 | 9·67 |
| Fowler's Bay | 0·94 | 14·29 | 11·87 | 12·11 |
| Penong | 1·13 | 10·09 | 11·57 | 11·93 |
| Murat Bay | 0·90 | 14·40 | — | — |
| Smoky Bay | 0·62 | 14·18 | — | — |
| Streaky Bay | 1·01 | 15·88 | 15·31 | 15·31 |

| Station. | For Nov., 1916. | To end Nov., 1916. | Av'ge. to end Nov. | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| WEST OF SPENCER'S GULF—*continued.* | | | | |
| Port Elliston | 1·33 | 18·49 | 16·49 | 16·49 |
| Port Lincoln | 1·69 | 23·48 | 19·28 | 19·88 |
| Tumby Bay | 1·85 | 16·65 | 14·54 | 15·00 |
| Carrow | 2·20 | 18·66 | — | — |
| Cowell | 2·36 | 12·64 | 11·29 | 11 76 |
| Point Lowly | 2·58 | 13·48 | 15·60 | 12·21 |
| Petina | 0·40 | — | — | — |
| Talia | 1·10 | — | — | — |
| Cummins | 1·95 | — | — | — |
| Arno Bay | 1 26 | — | — | — |
| Cleve | 1·41 | — | — | — |
| Hummock Hill | 1·34 | — | — | — |
| Port Vincent | 1·38 | — | — | — |
| YORKE'S PENINSULA. | | | | |
| Wallaroo | 1·64 | 18·39 | 13·53 | 14·05 |
| Kadina | 2·36 | 21·88 | 15·33 | 15·88 |
| Moonta | 2·63 | 21·77 | 14·62 | 15·22 |
| Green's Plains | 1·89 | 20·37 | 15·24 | 15·73 |
| Maitland | 3·04 | 30·06 | 19·36 | 20·08 |
| Ardrossan | 1·41 | 18·88 | 13·38 | 13·89 |
| Port Victoria | 1·56 | 21·45 | 14·63 | 15·20 |
| Curramulka | 1·03 | 20·64 | 17·90 | 18·51 |
| Minlaton | 2·13 | 25·15 | 16·85 | 17·41 |
| Stansbury | 1·95 | 20·90 | 16·51 | 17·06 |
| Warooka | 2·94 | 22·40 | 17·15 | 17·71 |
| Yorketown | 2·99 | 21·98 | 16·89 | 17·47 |
| Edithburgh | 2·64 | 21·32 | 15·89 | 16·48 |
| SOUTH AND SOUTH-EAST. | | | | |
| Cape Borda | 2·68 | 25·80 | 24·33 | 25·09 |
| Kingscote | 2·26 | 22·55 | 18·23 | 18·95 |
| Penneshaw | 2·68 | 22·11 | 20·54 | 21·34 |
| Cape Willoughby | 3·67 | 29·86 | 18·88 | 19·69 |
| Victor Harbor | 3·46 | 21·36 | 21·35 | 22·18 |
| Port Elliot | 3·41 | 20·45 | 19·56 | 20·33 |
| Goolwa | 3·94 | 21·98 | 17·22 | 17·93 |
| Pinnaroo | 3·49 | 20·13 | 15·80 | 16·74 |
| Parilla | 2·88 | 19·95 | — | — |
| Lameroo | 2·42 | 20·37 | 15·59 | 16·55 |
| Parrakie | 2·24 | 17·44 | — | — |
| Geranium | 2·69 | 20·45 | — | — |
| Peake | 2·80 | 19·95 | — | — |
| Cooke's Plains | 3·23 | 20·93 | 13·98 | 14·74 |
| Coomandook | 3·07 | 23·03 | — | — |
| Kalangadoo | 5·19 | — | — | 18·87 |
| Meningie | 2·83 | 22·32 | 18·04 | 17·49 |
| Coonalpyn | 2·48 | 21·98 | 16·55 | 16·80 |
| Tintinara | 2·48 | 23·30 | 17·61 | 18·78 |
| Keith | 2·38 | 21·04 | — | — |
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* No report received during the month of October. + Formal report only received.
‡ Held over until next month.

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# ADVISORY BOARD OF AGRICULTURE.

## Date of Meeting—January 10th, 1917.

# THE AGRICULTURAL BUREAU OF SOUTH AUSTRALIA.

**Every producer should be a member of the Agricultural Bureau. A postcard to the Department of Agriculture will bring information as to the name and address of the secretary of the nearest Branch.**

**If the nearest Branch is too far from the reader's home, the opportunity occurs to form a new one. Write to the department for fuller particulars concerning the work of this institution.**

# REPORTS OF BUREAU MEETINGS.

## UPPER-NORTH DISTRICT.

## (PETERSBURG AND NORTHWARD.)

### MORCHARD (Average annual rainfall, 11in. to 12in.).

October 9th.—Present: 17 members and one visitor.

Care and Feeding of Working Horses.—A paper on this subject was read by Mr. S. Twigden, who said that if horses were kept in a small paddock adjoining the stables they would require less attention than if enclosed in a stable. Hay should be slightly on the green side, and a mixture of wheat and white oats was preferable. Every master should see that each horse received its proper share of feed, that it was fed at regular hours with a properly balanced ration, and given time to finish its feed. Horses should have regular hours of work, and eight hours of general farm work was sufficient. Every horse should have a collar of its own. Changing collars from horse to horse every day was a sure method of producing sore shoulders. Unevenness of length of chains very often resulted in sore shoulders. The animals should be groomed every morning. Mr. H. Brown considered that hay should not be too green and should have plenty of grain in it. Mr. H. A. Tilbrook said that horses should not work more than four hours without something to eat. Mr. W. Toop preferred wheat and oaten hay mixed and cut somewhat green. Horses should always be watered before meals. Mr. E. J. Kitto said that damped feed was very beneficial in summer and autumn. Wattle bark lotion was good for tender shoulders. Mr. R. Jasper said that a horse should not be given more to eat than it could clean up. Mr. Scriven said that slow eaters should always be allowed time to eat their feed.

The Privileges of the Bureau.—Mr. J. W. Reichstein read a paper on the privileges of the Bureau, in which he said that the object of the Bureau was the improvement of the agricultural industry by the dissemination of practical information and scientific knowledge. The Bureau enabled the scientific officers of the Department to educate the farmers in the latest methods in the raising and treatment of produce. Members of the Bureau should be regular attendants at the meetings, and take a fair share of the work. They should make it their duty to bring under the attention of other members any matters of practical interest connected with agriculture which they might notice, and should give freely of their experience for the benefit of their fellows. Mr. W. Toop said that if farmers took more interest in the Bureau, much more would be learned. Mr. Kitto said that the Agricultural Bureau had greatly influenced a better class of farming in South Australia.

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AMYTON, October 17th.—A paper was read by Mr. H. C. Pitchers dealing with farming on scientific lines. He traced the growth of modern methods of farming and showed the necessity for them. In the course of discussion, Mr. H. K. Gum said that he favored shallow fallowing and feeding off with sheep. Mr. Foulis expressed the opinion that it was possible to spoil a crop with too much manure. Mr. W. Gum said that rain was the best fertiliser, but considered that some manure should be used. Mr. Donohue said that manure improved green land, but fallow did not require it so much.

EURELIA, November 25th.—The initial meeting of the Branch was well attended. A paper was read on breakages in binders, by Mr. C. A. Kaerger, in which he pointed out that the parts which most frequently broke in binders were the fans. It was a great improvement to thread No. 14 binding wire about 2in. from the ends of fans (in heavy crops at both ends) in order to make a complete circle. That held the fans more firmly and prevented them giving way. Another improvement was to fix a prop to the pole, which would keep the weight off the horses' necks when the machine was stopped. It could be so arranged to be unstrapped when needed.

HAWKER, September 19th.—Mr. J. Smith read a paper on the cheapest method of harvesting wheat crops in that district, contending that the combined harvester provided the most useful and the cheapest method of garnering the crop. Members, in discussion, agreed with the views of the writer of the paper, if the farmer were sure of harvesting 8bush. to the acre.

October 18th.—Mr. B. Mansom read a paper dealing with bookkeeping on the farm, in which he urged the many advantages to be derived in farming from the maintenance of a proper set of books.

HOOKINA, October 10th.—Mr. B. Murphy read a paper on haymaking, in which he advocated cutting plenty of hay, when the opportunity occurred in that district, where dry seasons were experienced every few years. Wheat should be cut before the grain was more than three parts full sized, because the straw was much sweeter and all the flag was saved. If left until later, waste occurred in the grain in carting and stacking, and mice and birds did considerable damage. Parts of the crop dirty with wild oats should be cut away, because if allowed to ripen the seeds would be blown over the ground and a very dirty crop would be reaped the following year. It was a great saving of labor to cut hay with a binder, because sheaved hay could be carted when it was too windy to cart loose hay. Members generally concurred in the views expressed.

WILMINGTON, October 11th.—Mr. Farrell read a paper entitled, "Will Bulk Handling of Wheat Benefit the Farmer?" and it excited considerable discussion.

## MIDDLE-NORTH DISTRICT.

### (PETERSBURG TO FARRELL'S FLAT.)

### BEAUFORT.

October 5th.—Present: six members and one visitor.

SIDE LINES ON THE FARM.—In a paper dealing with side lines on a farm, Mr. G. Underwood drew attention first of all to sheep, without which, he said, the farm was not complete. The Merino, free of wrinkles and without much grease in the wool, was the breed preferred. The rams could be allowed to run with the ewes all the year round. Ewes could be saved for breeding and wethers used for mutton. Three or four cows, preferably of the Shorthorn breed, should be kept. These should be purchased just when coming into milk, kept as long as possible, and then fattened and sold. Pigs could be fed on slops from the house, skim milk, and waste corn. They should be given the run of an acre or so, wire netted and enclosing a straw stack. The Mid York was the best breed. Poultry, and a few Guinea fowls should be allowed the run of the place, and geese kept apart from the fowls and carefully attended, had their place on the farm. Mr. Mugford agreed that sheep came first, as they provided meat and wool and also kept the fallow clean. They paid the best. Cows also paid well, especially of late, because dairy produce had been a good price. Pigs were also profitable and it was a good idea to have a straw stack instead of a sty, because it would keep the pigs warm and clean. Poultry were good and not much trouble. Mr. W. B. Sampson said if sheep were kept the tendency would be to spare the feed and leave the fallowing until it was too late and loss would be incurred in that way. He thought fowls paid the best. All that had to be done was to throw them a bit of wheat and then let them scratch for the rest. Mr. J. Sampson said sheep were the most profitable. As long as the fences were strong, they would look after themselves. He was averse to leaving the rams with the ewes all the year round. Lincolns and Shrops. were the best for mutton, but they required better fences than the Merino, which was the best for wool. The more wrinkles the more wool. Cows were too much of a tie and made too much work. The Yorkshire pigs were becoming favorites, but he thought they got too fat. Poultry were very profitable and not much trouble. Mr. C. Wilson found that Guinea fowls would not keep the foxes away. He also liked the Mid York pigs.

### BEETALOO VALLEY (Average annual rainfall, 18in. to 19in.).

October 9th.—Present: 10 members and three visitors.

**Handling Young Horses.**—Mr. A. Clogg read a paper on the handling of young horses, in which he recommended driving the animal into a small yard, putting a rope on its neck, and tying it up to a post. It would do the horse no harm to have a good pull, and then it should be rubbed gently with the hand, or, if it were very wild, with a stick until the animal realised that it was not to be hurt. Then a halter should be put on. There might be some difficulty about that operation, and it was well to have a spring hook at the bit which should be undone and the halter then slipped over the ears. A point should be made of always treating the animal kindly. When the colt had been caught a rein should be attached to the bit, and the animal made to run in a circle, first on one side and then on the other. If very hard to hold, the rein should be slipped through the bit rings under the jaws, and one man could then very easily hold it. When put to work, it should be in a well-fitting collar, and the horse should not be worked too long. When returning to the yard before being turned out, the animal should have its shoulders washed with cold water and salt. If not in a tandem team, the colt should be driven with reins and made to draw a log before being driven with a breast team, in order to accustom it to the collar. To make the colt start with the others, it should be touched lightly with a stick and called by name. Mr. Cox preferred an old collar for a young horse, and put the young horse in the body of a wagon after handling. Mr. Bartrum recommended teaching foals to be accustomed to be tied up.

**Gardening in Beetaloo Valley.**—Premising that Beetaloo Valley was an ideal spot for gardening, Mr. A. H. Jacobi, in a paper dealing with gardening in that area, said it was well sheltered on the eastern and western sides by high rows of hills, which formed natural windbreaks, and provided an underground soakage to the alluvial flats where oranges, lemons, and vines did well and yielded heavy crops of good quality. Those alluvial flats were not suitable for growing crops of wheat, but with a fair amount of stable manure, they could not be excelled for producing root crops, which could be grown between the other trees. The bird pest was against growing vines, which could not be made profitable until a check was put on the birds. The eastern slopes could be planted with almost any kind of fruit trees, the only ones unprofitable in his experience being walnut and cherry trees. The past summer's experience showed that a wind break was required on the north side of gardens, as that portion of the garden had suffered somewhat from hot winds. Therefore he recommended planting a double row of almond trees. They required no looking after, and very often gave a profitable return. Olives might answer the same purpose. It would be well to experiment with a few trees before planting largely. Mr. Burton agreed that cherry growing was not suitable in that district but certain kinds of walnuts might do. Citrus fruits were most profitable, and vegetables also. They would soon pay for an irrigation plant.

### BOOLEROO CENTRE (Average annual rainfall, 15.83in.).

November 10th.—Present: five members and one visitor.

**Tree Planting.**—Trees not only benefited stock and human beings, observed Mr. E. J. Nottle, in a paper on tree planting, but also improved the appearance of property. Trees were also valuable for their timber, and as the forests of the world were diminishing rapidly, it was important that they should be planted promptly to secure the future timber supply. The demand was continuous and increasing. In that district tree planting would minimise the devastation of the hot drying north winds, which took the moisture out of the soil. He recommended the Kurrajong, which grew to a height of 30ft., and not only afforded extensive shade, but provided good feed for stock. In Spain, areas which had been denuded of timber for the production of charcoal were ravaged by the winds, which, taking the moisture out of the soil, transformed the land into sandy wastes. Experiments had demonstrated that in forest lands 25 per cent. more rain was registered than on open land. Mr. W. H. Nottle, sen., referred to the usefulness of trees, which he had planted as shelters for sheep and their beautifying effect upon the landscape. Mr. W. G. Whibley also endorsed the views of the writer of the paper, and commented on the value of trees as windbreaks and for sheltering stock.

## GLADSTONE (Average annual rainfall, 16in.).

October 7th.—Present: 18 members.

**Pigs on the Farm.**—Pigs should be on every farm, observed Mr. A. B. Blesing, in a paper on that subject, whether bred on the farm or purchased as weaners to fatten. The farmer who bred his own pigs secured the breeder's profits, which, under present conditions, meant a very good return. As to the breed of pigs, for bacon he preferred the Berkshire and Yorkshire cross or even the Berkshire and Tamworth cross, which produced a good bacon pig, something that would grow and not get too fat. If farmers took more care than was usual over wheat cleaning, and the rubbish, such as screenings, white heads, &c., were fed to the pigs and turned into pork or bacon, profit could be made, and a better sample of wheat sent to market. Pigs, if fed in a proper manner, did not require a great amount of food to make them grow. If bought early in the year—from July to October—and one had a cow or two, the skim milk through the spring, with a little green feed, would keep them in good growing condition. Better still would be a small pig-proof paddock sown with barley. With plenty of exercise pigs grew better than when shut up in a small sty, and there was not nearly so much work looking after them, especially if the water was laid on. Pigs, if fed in that way and kept in a fair growing condition, should produce a carcass weighing from 200lbs. to 250lbs. at 12 months old. They should not be kept more than 12 months, except for breeding, as young pork was always preferable to pork from old pigs. Curing the older animal was more risky than the smaller or younger one. Every farmer should know how to cure his own bacon and hams. It was simple enough, and did not involve a great amount of time. In reply to questions, Mr. Blesing said that the following mixture had proved excellent for curing bacon:—For rubbing into the meat—64lbs. salt, 4lbs. brown sugar, ½lb. saltpetre; for the brine—enough salt should be used to make the liquid sufficiently strong for an egg to float in. The water should be boiled before the salt was mixed with it. The meat should be left in the brine about three weeks. An elaborate smoking house was not essential, one made of bags answering the purpose very well. In the discussion which ensued it was considered that pigs should be castrated when a week old.

## LEIGHTON (Average annual rainfall, 16in. to 17in.).

October 5th.—A small attendance.

**Breaking the Farm Colt.**—Mr. R. Flower read a paper entitled "Breaking the Farm Colt," in the course of which he urged that it was necessary to get the colt in a secure yard with one or two aged horses and put a rope on him by means of a lassoo or a crush pen. The next step was to put the halter and winkers on. A good scheme was to work the winkers gradually along the top of the neck until in position, leaving the bit to be put in last. To teach the colt to lead quickly practically without the aid of a whip, a rope should be passed up through the bit ring over the head and down the other side the same, and the rope tied together at the bottom. Then, with a sharp pull to either side and motioning and speaking an appropriate word or two, the colt would soon follow without the sharp pulls. The animal should then be attached to a log and taught to pull. It was strongly advisable to handle and educate the beast thoroughly before it was placed in the team. A good deal could be taught in a few hours, but firmness and tenderness were necessary.

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## MINTARO.

September 19th.—Present: 36 members and visitors.

**Homestead Meeting.**—The meeting was held at "Hillandale," the property of Mr. C. J. H. Wright (Vice-President). A general inspection of the farm took place, and particular interest centred in the wheat, barley, and oat stud plots, which had been carried on for several years. Various imported and local varieties were under test. A sprinkling plant, covering an area of about 50ft. x 25ft. at each shift, was worked by a 2-h.p. petrol engine, distributing the water direct from a well. Fruit and vegetables and plantations of sugar gums, other eucalypts and pines were favorably commented on. The visitors were entertained at tea, after which an address dealing with the chemistry of the farm and garden was delivered by Mr. Wright. He dealt at length with the general chemical principles underlying the life, growth, nourishment and protection of plants. The changes taking place at the germination of the seed were explained, and the various properties essential to growth were detailed. The power of roots to absorb food in solution was dealt with, and chemical factors which operated in connection with the time for cutting hay, the practice of fallowing, &c., were discussed. The properties and functions of humus were explained, and the importance of lime as a soil amendment emphasised. The composition of different classes of soils, and their physical properties were considered, as well as means for effecting their improvement. Mr. Wright spoke of his two years' experience with high-grade superphosphate (45-47 per cent.) which he recommended. He pointed out the wisdom of instituting a search for potash deposits in Australia, and the need for a classification and analysis of soils.

## MINTARO.

November 4th.—Present: 21 members.

Haymaking.—The first thing in growing wheat for hay, remarked Mr. James Thomas, in a paper on haymaking, was to determine what kind of wheat to grow. He preferred King's Early, Marshall's No. 3, and Bluey. The first named came to maturity early in the season, and so allowed the farmer to finish haymaking before commencing harvesting. The only disadvantage was that it had a tendency to go down, when left for grain. Marshall's No. 3 was a good all-round wheat, suitable for either hay or grain. Bluey was a late wheat, suitable for a chaff merchant, but rather too late to grow on an average farm, where the farmer was anxious to get his hay in before he started reaping. The best time to cut the hay was when the grain was in the doughy stage. The size of sheaves should be about 30in. in circumference at the band. After cutting and tying, the hay should be left for a day, and then put into round stooks of about 25 or 30 sheaves, with heads upward. The time to cart the hay could be determined by taking one of the centre sheaves from the stook, pulling therefrom a straw, and breaking it at the first joint. If it broke clean it was time to start carting. That usually occurred, if the weather was hot, about 10 or 12 days after cutting. The stack, in hilly country, should be built up and down the slope, because the water that fell from the roof of the stack would then run away from both sides. For dunnage he preferred logs of wood with a covering of straw. A stack of about 50 tons should be built 6yds. wide by 15yds. long, with an 18ft. wall, and about 9ft. from the eaves to the top. In building the stack, he preferred square corners, because it was easy to keep the corners from getting low. In commencing to build, the first row of sheaves should be laid butts out, and the second row with the heads out, the heads touching the bands of the first row, and the third row with the heads touching the bands of the second row, and so on, until the middle of the stack was reached. As the stack grew higher with each load thrown on, the height of the centre should be increased by adding a few extra layers of sheaves. By keeping the stack well filled in the centre it leaned outwards on the sides, and water which fell from the roof did not run down the sides. On reaching the height of 18ft., the centre should be filled before the roof was put on. Commencing the roof, he would lay one row of sheaves (butts out) about 6in. out all the way round except the ends, which would not be drawn in at all, but left as a gable. In placing the next layer the sheaves should be with heads out, well over the previous layer, and be backed up with another layer, so that the outside and the second row were butt to butt. That caused the butt of the next outside upper row to keep high, and so cause rain, should it fall before the stack was thatched, to run outwards. The laying of the outside layer heads out should be continued, only drawn in a few inches each time, with the second layer butts against the first layer, and the third row, heads out, covering the second layer, and so on, till the top of the stack was reached, when there would be a top to the stack that would keep out the rain without thatch. For thatching the stack, he preferred sheaved straw. His method was to first put wires over the stack with the weights attached, placing them about 5ft. apart. Then a row of sheaved straw (butts out) should be placed on the eaves, with a stick in the sheaf in order to prevent it from wrigging out with the wind. A string should then be drawn from one wire to the other, lifting the wire at the same time and tying it tightly. For the next upper row the sheaf heads should be placed out, the butt of the sheaf being pulled out slightly, and the string then drawn across again and tied. This process should be repeated until the top of the stack was reached, and then the other side should be done.—Mr. C. J. H. Wright considered King's White was the best wheat for hay, and the bearded head did not hurt the horses. He agreed with the suggestions in regard to stooking, and said that the time to stook was governed by the weather and the kind of land from which the hay was cut. On red land, it could be stooked straight after the binder, but on black land it should be left a day or two. Mr. Kelly preferred White Tuscan or Crossbred 53, but Algerian oats and a late wheat sown together for hay were best. He was averse to stooking on the flat, because the lower sheaves were always damaged. The best way to stook was to place the first sheaf so that it would stand alone, and the others should be grouped around, but so that they did not lean too much against the first sheaf. He preferred hand stooking to using the fork, because the sheaves could be put in the stook in better shape. He favored round corners to a stack, because square ones were difficult to keep straight. Mr. S. Garrard had not obtained very good results from Zealand Blue. If hay had to be left in the paddock long, it was well to make large, well-constructed stooks, with the sheaves upright, and then there would be no danger of damage from rain, and it kept a better color. No hay that was not properly dry should be put in the bottom of the stack. He preferred building the stack near the cutter, and then, with a shed over the cutter, in which the hay could be thrown, he could cut chaff on wet days. Mr. John Thomas preferred King's Early, grown with a late wheat, which gave some grain and a good color. He had grown Indian Runner 7ft. 6in. in height. It made good chaff and the horses liked it, but it caused teeth difficulties.

## YACKA.

October 16th.—Present: 11 members.

Poultry Farming.—A paper was read by Mr. W. T. Tilbrook on poultry farming, in which he said that looked after properly, fowls would pay, but if neglected or badly cared for they would never be a source of profit. To make poultry farming pure and simple profitable it required to be carried out on a large scale. That required money, a complete knowledge of the business in all its branches, and a capacity for hard work. On a farm poultry gave good profit when the matter was carefully studied, because a great deal of material which otherwise might go to waste could be used. Undoubtedly in that way profit could be made from keeping fowls in lots of 20 to 100 as opposed to poultry farming on a large scale. Fowls should be given clean water every day in vessels placed 2in. or 3in. off the ground, in order that the hens should not fill the receptacle with litter. All water should be kept in the shade. Young chickens should be fed on moistened bran and pollard, cracked wheat, or oats until three or four weeks old. Green feed chopped up very fine should be given two or three times a week. Two sizes of chickens should not be run together, because the small ones would not get enough to eat, and would be trampled on. As soon as the roosters could be distinguished they should be separated from the pullets. Weaklings should be killed off. On account of their variety the table scraps were about the best egg-producing food. They should be thrown into a pot, covered with water, and boiled. A little bran should be added to the mixture, and when cooled given to the fowls. Stale or sour scraps should not be given to the birds. It was bad policy to stint the food of the fowls. Stock birds should be good specimens of the breed, fully developed, and not less than 12 months old. Hens should be watched when moulting time arrived. A hen that always kept a rosy comb and shed a few feathers at a time had a good strong constitution. If hens were a long time moulting they should be caught and all the old long wing and tail feathers pulled out. It would be found that they would then quickly feather up. They should also have meat two or three times a week, for meat assisted in the production of new feathers. Hens should be set on the ground, and about three days before the eggs hatched insectibane should be sprinkled around the nest and on the hen. The old nest should be taken out and fresh straw supplied. Hens should not be set on chaff. The chickens should be left until about 48 hours old, and then moved to a fresh place and put on the ground It was a good plan to provide a small yard enclosed with fine wire netting, that the chickens could not get through, and then the hen could protect them. The ground should be soft, and there should be plenty of scratching litter for the chickens to run on, or they would be troubled with scaly legs or corns.

BUNDALEER SPRINGS, October 9th.—The paper contributed to congress by Mr. G. Hill, of Georgetown, entitled "Care of the Farm Mare," was read and discussed.

CANOWIE BELT, November 11th.—The meeting of the Branch took the form of a visit to the Government Experimental Farm at Booborowie, which proved interesting and instructive.

CRYSTAL BROOK, October 21st.—Mr. A. E. Clarke read a paper entitled, "Should Political Subjects be Discussed at Bureau Meetings?" and arrived at the conclusion that they should not. An animated discussion took place, in which the opinion was almost unanimous that political questions should be excluded from Bureau discussions.

GEORGETOWN, October 11th.—Mr. M. J. McAuley read a paper describing operations performed by Mr. F. E. Place, the Government Veterinary Expert, during his visit to Georgetown in June last.

HILL TOWN, September 29th.—Mr. C. Kostera read a paper on colt breaking on the farm, which was freely discussed, members generally endorsing the views expressed in the paper.

NORTH BOOBOROWIE, November 13th.—Mr. S. E. Mudge delivered a short address on harvesting barley. He advised reaping at once, when the barley was ripe, with a wide-combed dampweather stripper. It was necessary to tread out the heads before winnowing, and he recommended, where possible, the use of the binder and thresher in preference to the stripper and winnower. Mr. W. H. Richards said that a wide-combed highly-geared damp weather stripper with the beaters set close to the comb, would, if the horses were driven quickly, thresh out the heads sufficiently to obviate the necessity for tramping out the heads before winnowing, to obtain a clean sample. Mr. Mayfield and Mr. Hannaford respectively delivered short addresses on cutting lucerne with the binder and with the mower. In the discussion which ensued the consensus of opinion was in favor of the mower.

YONGALA VALE, October 14th.—Mr. T. H. Battersby read a paper on the relative merits of heading and harvesting wheat, and arrived at a conclusion in favor of harvesting.

## LOWER-NORTH DISTRICT.

### (ADELAIDE TO FARRELL'S FLAT)

### ANGASTON (Average annual rainfall, 22.25in.).

November 3rd.—Present: 17 members and three visitors.

GYPSUM.—Dealing with the value of gypsum, Mr. G. Sharp, in a paper, referred to the marked benefits which had resulted from its application to land at Renmark. Its mechanical action, he said, was to break down and open up heavy soils, whilst loose, sandy soils were bound together, and acquired body and the capacity to resist their natural tendency to drift He then quoted at length various opinions and testimonies to the value of that manure, mentioning that it was important to remember that the gypsum should not be ploughed under, but should be spread on the ploughed land, and afterwards drilled or cultivated in. As a deodoriser, he said, gypsum was one of the finest substances known, and a quantity in a box should be kept handy to every manure heap, and a few handfuls being scattered over the stalls and manure heaps every day. That would have the effect of fixing for plant use the carbonate of ammonia, which was so frequently lost. The recommendation that heavy, argillaceous soils should be dressed with gypsum to transform the large store of carbonate in the soil into carbonate of potash, and thus make potassic manures unnecessary, was of great importance at the present time, when potash was so difficult to procure.

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### FREELING (Average annual rainfall, 17.85in.).

September 7th.—Present: seven members and seven visitors.

HORSES STILL IN DEMAND.—Under this title, Mr. E. Morris read a paper, in which he said that Australia possessed the climatic conditions and the country for breeding horses, and all that was necessary was to stick to the correct stamp of horse. There was, however, much to be done, and room for still greater improvement, before this country became nearly so far advanced as other countries. It was indisputable that horse breeding cost money. The French Government about three years ago distributed £840,000 in prizes at horse shows and otherwise in fostering the horse-breeding industry, and bounties were given to the owners of approved stallions standing for service at moderate prices. In addition to that, the Government maintained over 3,400 well-bred stallions of its own. Fabulous figures had been given for stallions by the United States, the Argentine Republic, and Austria. There was food for reflection. It seemed improbable that the horse was going to die out just yet. Therefore they should not neglect the establishment of an industry so tempting in its possibilities. It was an absolute certainty that there would always be a market for high-class horses, and it would be profitable to watch the export market in the future in that direction.—Considerable discussion ensued.

### GAWLER RIVER (Average annual rainfall, 17in. to 18in.).

October 11th.—Present: nine members.

Binders.—In a paper on this subject, Mr. E. Winckel said that a farmer when buying a binder should purchase a machine from a firm who could be relied upon to ensure that an ample stock of extras was handled by the local agent. There was a great difference in the prices at which similar extras were sold by the various vendors of machines, and farmers should post themselves carefully in those details and purchase a machine which would not cause them an unreasonable amount of expense for repairs as it became old. The object of the main frame on all binders was to provide ample strength, with a minimum of weight, to ensure that the machine would be kept in perfect alignment, even though working amongst stumps and stones of rough country. If the frame were so weak as to permit the perfect alignment of any part of the machine to become deranged, it would create undue friction, which would add materially to the draught. Elevators should be designed to handle both light and heavy crops and not cause an undue strain on the canvases. In some machines the upper elevator floated from three corners only, but in others they floated from all four corners. The machines which floated from all four corners were undoubtedly the better, because every time the elevator rose in the three-corner float machine it threw the elevator with a twist, which at times caused the canvases to catch on one of the corners. The reel was a point which was generally overlooked by the farmer, not only when purchasing a machine, but also when at work. Conditions of crops in different paddocks and sometimes in one paddock varied so much that the reel should be worked far more than was generally done. In most binders the reel had a wide range of adjustment, and that should be taken advantage of where tangled and uneven crops had to be harvested. The reel should not be allowed to sag, because it was impossible to do good work unless it was kept in a horizontal position. The main chain, made of malleable links and steel pins, was far before the slip link chain, and was much longer lived. Though more expensive at first, it was cheaper in the long run, not only intrinsically, but as soon as a chain became the least fraction too long, the sprockets would begin to suffer. Therefore it was advisable to renew chains and sprocket wheels simultaneously, because new chains would not work well on worn sprockets. There was a great difference of opinion as to the weights of various binders, probably occasioned by the difference in draught. Farmers generally considered that the heaviest machine to pull was the heaviest machine in weight. That, however, was not necessarily so, because practically all the standard binders on the market weighed about the same. In fact, it was doubtful whether there was 56lbs. difference between them. The variation in draught was created solely by diversity in design of rubber and ball bearing, &c. Much depended upon the compression of binders as to whether they would tie the bundles tightly enough to satisfy the farmers. There was, however, one point about tying tightly which deserved a certain amount of attention, and that was the general wear on the machines. The more tightly a sheaf was tied the more quickly the machine was going to wear by reason of the increased strain induced by compressing. There appeared to be a wide difference of opinion as to which was the best butter for binders. Some preferred the kicking wood butter, others the rotary butter with the leather belt. Those who preferred the wood butter, claimed that the draught on the machine was lighter, that the cost for repair parts was less, that it would make a much better sheaf, both in exceptionally heavy crops and really light ones, and that in ordinary crops very little difference could be noted between the two butters. The driving bar or pitman should be kept tight fitting, because that and sharp knives made a binder run much more smoothly than worn and blunt ones. Care should be taken to make a cut as low as possible without cutting earth, and for that reason it was essential to roll all land intended for hay, because a few cwt. per acre could very easily be lost when the binder had to be kept 2in. or 3in. higher. It was possible in some well worked even paddocks to cut the stubble down to 1in. or very little longer. He had seen stubble 3in. and 4in. in length where crops were standing quite upright. A great many farmers abuse the sheaf-carrier on a binder. Practically on all binders sheaf-carriers were constructed to carry only three or four bundles, and if that were strictly adhered to little trouble, if any, would be experienced with it. Discussion ensued on the sharpening of knives, double set of fingers on the comb, and the leading points on various machines.

## LONE PINE.

October 16th.—Present: 18 members and eight visitors.

POULTRY FARMING.—In making a start in poultry farming, it was essential to commence with pure breeds, and the best at that, said Mr. A. Hoklas in a paper on poultry farming. There was no best breed for all purposes, therefore it was necessary to carefully consider the selection of a breed, and when once the selection had been made, to stick to it. Failure could nearly always be traced to the owner rather than the breed he kept. White Leghorns were the most satisfactory for egg laying, producing good sized marketable eggs at a profit. They were small eaters and good doers, and were bound to give satisfaction wherever kept.. He strongly advised a cross between a White Leghorn cock and Silver Wyandotte hen, but both of them should be pure bred. It was advisable, however, never to go beyond a first cross. The rooster should be at least one year old and the hen two years old before being bred from. The cock should be active and vigorous and a constant crower. Breeding hens should have plenty of exercise and, for that purpose the feeding ground should be well covered with cocky chaff or straw and the grain thrown into it. If hens had not sufficient scratching exercise there was a tendency to get too fat, with the result that the eggs would be deficient in yolk and therefore would not contain enough food for the chicken to live on until hatched. Every breeder should have at least a small incubator, which would enable him to hatch chickens early in the season, when broody hens were mostly very scarce; these chickens would then commence laying when eggs were generally high in price. In feeding, cleanliness was essential. All food should be placed on boards or in troughs and not thrown on the ground. A plentiful supply of greenstuff was absolutely necessary. Laying hens should have a warm mash in the morning and grain in the evening, with a liberal supply of greenfeed in the middle of the day. It was also essential to give fowls clean fresh water daily, because most diseases were caused by drinking impure water. Fowl houses should be well ventilated and roomy, and the droppings should be removed twice a week.

## RIVERTON.

October 14.—Present: 18 members and five visitors.

STRIPPERS AND HARVESTERS.—Both strippers and harvesters, declared Mr. E. A. Gray, in a paper dealing with the relative merits of those machines, had staunch advocates, and it was a highly debatable point which was the more profitable. The combined harvester, as its name indicated, practically completed, in one operation, all the work of gathering the grain ready for market. In that way it had an outstanding advantage over the stripper in labor saving, and for that reason, in present scarcity of labor, had many advocates. The defects in a modern complete harvesters were that every machine, however good it was or however competent the driver, lost a certain amount of grain. A harvester or stripper would not take large foreign plants, such as wild turnip, cabbage, &c., and that caused much stoppage and waste of time. Perhaps the greatest defect was in the fact that all rubbish seeds were redistributed, much to the detriment of the succeeding crop. It was impossible to reap in damp weather. Another point, however, which did not directly affect the farmer was the uneven sample of wheat which was sometimes sent to the market. It was impossible to secure a good even sample on hilly ground. A good sample would be obtained down the middle of the bag, but, around the sides, chaff, &c., would often be found. That must have an effect on the sample of wheat the State produced. The great advantage of the harvester was that it was a labor-saver, and that had outweighed all its defects. Most of those defects applied to the ordinary stripper, but the stripper presented the advantage that a more even marketable sample was secured, as any green grains ripened in the heap; but more time was lost in emptying the machine. The advantage of the reaper-thresher was that there was no trouble with chokes, because the heads were cut off with a knife and conveyed by means of a canvas apron to the threshing drum. He had not had any experience with those machines, but their great drawbacks were the amount of strength required to work them and the strain on the machinery when starting. Heading and threshing was a system of harvesting which he judged to be superior to any mentioned. The advantages were:—(1) Harvesting could be commenced 10 to 12 days earlier than with the harvester, because the grain would ripen in the sheaf, and an even sample of good color was produced; (2) the straw was more palatable to stock than stripped straw. It had a better feeding value, since it was much greener in color; (3) it cleaned the land of rubbish, such as cabbage, charlock, turnip, &c.; (4) the risk of damage to crops by storms was diminished; and (5) all the grain was secured. He preferred the thresher to the header. Under the header system it was impossible to know how much grain was left in the sheaves. In some sheaves there was as much grain at the band as anywhere. Necessarily there was considerable waste at times. In regard to cutting the crop for threshing, there were two points to be considered, viz., whether it was required to conserve straw, in which case it was necessary to cut close to the ground; but if for grain chiefly, the cut could be made from 6in. to a foot from the ground, according to the crop, which could be regulated by the man on the binder. The lower cut made a great deal of difference in the output of a day's work, in connection with the length of straw. The chaff and cavings from the straw were a valuable asset, because the stock would eat it readily and do well on it. A threshing plant to do about 450bush. to 500bush. per day would require from 10 men to 12 men, that was if carted in from the field; but if stacked it could be done with two to four men less. When stacked the work would be got through more quickly, and there would be no loss of time between loads or on account of dull weather.

## ROSENTHAL.

October 11th.—Present: 32 members and four visitors.

Broadcast and Drilling.—Commencing with the premise that there were conditions under which broadcast would give better results than the drill, especially for hay, Mr. T. H. Arnold, in a paper entitled "Broadcast and Drilling," remarked that when land was fallowed late or not fallowed at all, drilling was, without doubt, the better way, since by placing the manure and seed together, the grain obtained all the available forcing tendencies which the manure was capable of giving, and was thereby helped to get ahead of, and eventually master, the weeds. He drilled about 20 acres right through the middle of a paddock. On either side the manure had been put in beforehand, and the whole of the section was seeded in less than a fortnight. He then commenced at one side of the paddock broadcasting the seed, and when he came to the piece that had not been manured, he drilled it with seed and manure, and then finished broadcasting the remaining piece. The whole section was seeded with the one variety of wheat (White Tuscan) and was eventually all cut for hay. The drilled portion came up a trifle more thickly than the broadcasted part, and during the winter months forged slightly ahead, but towards the end of September the broadcasted pieces caught up, and at harvest time were from 6in. to 8in. higher and very much thicker than the drilled piece, which thinned out considerably with black rust. No rust appeared in the rest of the paddock. A few of the advantages of broadcasting were that the manure could be drilled into the land towards the end of summer, usually in March, when both land and manure were thoroughly dry. A start should be made sufficiently early in order that if any wet or very windy days were encountered, the work could be left. Then when seed time arrived, if the land were fallowed and in thorough order, the actual seeding could be accomplished very quickly. Experience had shown that the first half of the crop, put in while the weeds were small with a medium weight set of chisel harrows, yielded in nine seasons out of ten, a much heavier hay crop than the latter sown half. It should be clearly understood that he did not advocate broadcasting for grain. It might or might not be as conducive to big grain yields as drilling, but if the land were in thorough order, he claimed that, for hay purposes, it was the better way. By first drilling in the manure during the dry weather and then broadcasting the seed when the time arrived, there was much less labor involved just at a time when it was expedient to get over as much ground in as short a time as possible. The only method to secure as thick a crop with the drill, without crowding in the rows, was to cross drill once each way, which meant more labor still. There was in favor of broadcasting, the fact that the heaviest hay crop grown in the Roseworthy district, in his experience, was broadcasted and covered in with the common harrows. That was a 62 acre section sown with Dart's Imperial, which averaged 4 tons 6cwts. per acre.

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## SADDLEWORTH (Average annual rainfall, 19.69in.).

October 7th.—Present: eight members.

Growing, Stacking, and Preserving Hay.—With hay, remarked Mr. W. Crawford in a paper on growing, stacking, and preserving hay, it paid to cut the best. The most profitable hay wheats were White Tuscan, Field Marshall, Baroota Wonder, Bluey, Kings, and Zealand Blue. He was not keen on bearded wheats, however, as he had seen a horse's jaw in bad condition from eating beardy chaff. Zealand Blue was a wheat fast coming into favor as a hay wheat. It mattered not how long or coarse it grew, if fed long or otherwise, horses would eat every particle of it. Baroota Wonder was not liked, nor did Yandilla King make a good hay. Federation quality was good, but it did not cut such a good looking chaff. Old Bluey cut into excellent chaff, but was late and liable to rust. Early varieties were too brittle and did not make good hay. Purple straw wheats were much better than white straw for hay. It was well to cut early, for weight and quality of chaff, with good green attractive color. It was a mistake to suppose that better weight was obtained by leaving the cutting until a full grain had formed. Sheaf for sheaf the riper cut stuff was heavier, but there were not so many sheaves per acre or nearly so much weight per acre. The earlier cut hay did not take so much out of the land. It could be cut too green, but for market, especially Interstate markets, there must be some green color in it. Markets such as Sydney, Broken Hill, as well as Adelaide, required to be considered. Medium sized sheaves were the best. The sheaf should be well tied to save waste, and it cut better too. The hay should be left lying in the sun one full day before stooking. A better green color and a sweeter hay would be obtained. It was a mistake to think that weight would be lost. On the other hand, to leave it three or four days was even a bigger mistake than stooking close up to the binder. The stooks should be four or five sheaves wide and as long as convenient. Large stooks were a mistake as there was more damage done by rain and more risk of sweating. Hay should not be carted into a big stack under a fortnight from cutting. The straw should crack at the knots. If permitted to lie about in the paddocks for weeks it became dry and brittle and would not cut; however, it might be damped or steamed. Hay came out of the stack much the same as it went in. There should be a good bed of straw to stack the hay on. One musty damaged sheaf at the bottom was worse to mix with good hay than a dozen discolored sheaves at the top. The stack should be allowed to spring a little so that water running off would drip clear of the walls. Whether butts or heads should be out was a matter of opinion, but the middle required to be kept 4ft. or 5ft. higher than the sides. He favored heads out, because they could be placed more quickly in that way. The roof should be made with the heads out every time. Rain would spoil them, but only the heads, while if the butts were out, heavy rain would spoil the sheaves for two or three layers down. It was well to get the stack covered as quickly as possible, and cover it properly, or all the previous work would be in vain. A good thatch was the only way worth while. The extra expense was trifling. Less straw was required than if put on loose. Mice did less damage under thatch than loose straw. Iron sheds for hay for the farmer's own use were best.

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## SALISBURY (Average annual rainfall, 18.57in.).

November 7th.—Present: 15 members.

The Horse.—A lengthy and instructive paper dealing with the horse was contributed by Mr. R. W. Cilento. The writer of the paper traversed in an entertaining manner the development of the animal from the embryo to maturity. The anatomy of the animal was explained, and its evolution traced. In the discussion which followed Mr. Fleet said that when his horses were afforded the choice of feeding from the manger or the ground they always preferred the latter. He considered that the latter was the most natural feeding position. A visitor stated that old tram horses, which had been accustomed to feeding in a manger for many years, when taken on to a farm and turned on to the flats proceeded to the hillsides at first, and fed there, until accustomed to the changed conditions.

ANGASTON, October 16th.—Reminiscences of life members were tendered by Mr. R. Player and Mr. W. Sibley, both of whom have completed 20 years' membership of the Angaston Branch of the Agricultural Bureau. Mr. Sibley paid a tribute to the advantages to be derived from membership of the Bureau, and summarised the improvements made in fruit production during his association with the Angaston Branch. Mr. R. Player said that the very many practical papers read at the Bureau meetings and the discussions thereon had done an immense amount of good. Through the instrumentality of the Bureau in advocating new methods, land at Moculta, which had been regarded as worn out for wheat growing, had been brought back almost to its virgin condition. The Bureau system had also been responsible for the education of the people in the use of artificial fertilisers. By the same means the saving of the apricot trees had been brought about and the cincturing of the currant vine had become known. The pioneers of the introduction of spraying sprang from the Bureau.

NANTAWARRA, October 5th.—Mr. Sleep initiated a discussion on the mice plague. Mr. T. Dixon said that if sulphur were sprinkled about a stack of hay, mice would not touch it.

NORTHFIELD, September 5th.—In the report of the meeting of this Branch, appearing on page 316 of the November issue, Mr. Sandercock is stated to have read a paper on farming in the North. The name of the writer of the paper, Mr. R. J. Lamber, was omitted.

## YORKE PENINSULA DISTRICT.

### (TO BUTE.)

### BRENTWOOD.

October 12th.—Present: 17 members and seven visitors.

Pig Raising.—The chief points in pig raising, urged Mr. A. J. Babbage in a paper on that subject, were early maturity, their adaptability to being fattened at any age, and the ultimate heavy weight of matured animal. A pure bred animal was essential, and he favored the Berkshire, because it was a good doer and displayed fine qualities. As regards sows, he was averse to mongrels, and the young of pure breeds did not do well. For bacon pigs, he preferred the Berkshire or the Mid York-Berkshire cross. Sows should not be too fat, because in that condition they were apt to overlay their young. A sow should be put in her sty a fortnight before farrowing, and given plenty of sloppy food to produce milk. No corn should be fed to the sow for a week before farrowing, but she should be give scalded bran, a little milk, and pollard, and it should be given warm. Suckers should be given a free run out of the sty, but the sow should be kept in the pen. Castration should take place at four weeks, and the suckers should be weaned at seven or eight weeks. The young pigs should then be shut up and given good food, such as boiled or crushed wheat and pollard, three or four times per day, but they should be only given as much as they would clean up. When six months old they should have a dressed weight of 120lbs. to 140lbs., and be ready for market. Boars might be used for service when seven months old, but sows should not farrow until 14 months old. Oats and barley made a good change of food for dry sows and boars. Good warm sties were required, which should be 14ft. x 12ft., and 5ft. high at the back, sloping to 3ft. 6in. in front. The back and sides should be of stone, and the front stone work, with an iron rail. The roof should be of iron. He preferred wooden troughs, cut from peppermint or gum logs, about 6ft. in length. They lasted a very long time. A general discussion followed on the question whether pigs should be run in small paddocks or confined in sties. Mr. Babbage said that store pigs should be run in small paddocks, but pigs for fattening should be shut up.

### BUTE (Average annual rainfall, 15.42in.).

September 19th.—Present: 17 members and two visitors.

Sheep on the Farm.—In a paper dealing with sheep on the farm, Mr. D. Walton said that it was necessary for every average sized farm (say 600 acres) to have a few sheep. Sheep very often found good feed in a paddock that was exhausted for horses and cattle. Merino sheep were about the best breed to keep. They were easily kept, and a handy size for killing purposes. It was a wise plan, should one turn out a rogue, to slaughter it as soon as possible, because if one rogue were allowed to go through fences, it would not be long before another in the flock would follow suit. Farmers should breed from a ram of the best quality obtainable. Should the ewes be young, an aged ram, say three and a half years, was preferable, because of better results at lambing time. Moreover, there were not so many deaths among the ewes as if a young ram were used, though that depended a good deal on the season. Sheep should have plenty of water to drink at any time, and not be kept too long in cold, bleak paddocks without a change, as they were subject to colds and rheumatism. Neither was it a good plan to leave them in a paddock where a straw stack was built, because they were apt to rub themselves against it and injure their fleeces. It was also injurious to allow sheep to run in stubble paddocks where the wheat had shed owing to the wind, or had been badly stripped, because a very little wheat would cause death to a sheep.

### MOONTA (Average annual rainfall, 15.22in.).

November 4th.—Present: 14 members and two visitors.

Labor-Saving Appliances on the Farm and in the Farm Home.—The first item dealt with in a paper by Mr. H. J. Cadd, devoted to the consideration of labor-saving appliances on the farm and in the farm home, was that of water supply. He would elevate water into a supply tank at least 12ft. high with a small mill, and then lay pipes from the supply tank to the kitchen, laundry, bath, and any other places required. In the laundry he would fix taps over each tub and over the copper. If they still believed in the old-fashioned tubs, with the everlasting rub and the tired, worn housewife at the end of the day, then of course almost any tub would do; but he hoped that they were leaving those days behind them. There were now on the market machines which would thoroughly wash, in five minutes, as many clothes as could be washed in an hour by the old hand-rubbing method, and the capital cost was only about £7. The copper should be built into one corner of the room, close to the washing machine. From the washer drain pipes should be fixed to carry off the dirty water. There would be plenty of pressure in the supply tank for baths, and a further saving of labor could be made by providing sinks to carry away waste water. A sink could be fixed at a trifling cost to any kitchen, thereby saving a great deal of hard work. They could be obtained at prices varying from 15s. to 30s. When fixed they also served as washing pans. A draining board could be fitted on one side, and a table top on the other. From the escape at the bottom the waste water could be led into a dry well or bamboo patch, each very effective for using up the wash water. In the kitchen there should be plenty of shelf and cupboard room, also an improved dresser, a double fireplace, and a kerosine stove. Those items he mentioned particularly, but of course there were scores of details. Where possible, he would always place the cellar below the kitchen, which was a great labor-saving arrangement. By fixing a lift to that all the food stuffs, cream, etc., could be run up and down, and there would be still further labor saved. Much work could be saved about the farm in the feeding of stock and poultry, not forgetting the water question also in that connection. If care were taken, the situation of the various feeding centres would help considerably to save labor. The poultry and pig yards should be between the house and stable, and all as nearly in a line as possible, street wise, if desired, so that in one journey all could be attended to. For fowls and pigs he recommended the erection of a bin to store the grain, capable of holding 10 or 12 bags. Those could be filled from the lorry, and when feeding time arrived, it would be only necessary to lift a trap door and the grain would run out. The bin system for storing the feed grain might be used to store all the grain, and the larger bins might take the place of the smaller bins suggested previously. Water should be laid to each feeding place and in each instance taps should be fitted. There were several systems of feeding horses, but he preferred the system he had established and found to be a very practicable and labor-saving scheme. He had the store room the length of the stable, and the floor on a level with the manger, with trap doors at intervals along the back of the manger. That gave ample room for storing six months' supply of chaff. The floor being on a level with the top of the manger, and trapdoors placed along the manger, the chaff could be easily and rapidly fed to the horses. There were many schemes for feeding, and much more care, in his opinion, should be taken about the arrangement of the feeding contrivances. Much labor could be saved in the barn if the floor were elevated to the height of a low lorry or ordinary dray, then a platform placed along the discharging side of the barn, and on the receiving side the ground should be made up to the level of the floor. Where possible the barn should be built on sloping ground, which naturally helped in construction. In practice a barn of that sort meant that the seed, super., &c., could be unloaded from the lorry on the made side just in the ordinary way. When seeding time arrived, or a load of wheat was required, the real benefit of that type of barn was realised. The greatest saving was made during seeding, when with a sack truck the whole of the super. and seed was simply trucked from the barn over the platform into the dray or lorry, one man being able to load the stuff more quickly and more easily than two men from the usual type of barn.—Mr. W. Edge said that the appliances suggested would not be within the reach of every farmer, but it would be very convenient to have the equipments Mr. Cadd had indicated. Mr. A. B. Ferguson said that all the pressure required could be obtained with a stand 3ft. high, and no mill would be necessary. The stables should be about 4 chains from the house. He preferred the chaff being above the horses in the stable, because they could be fed more easily. The pig yards should be a long way from the house, in order that, when the wind came from that direction, there would be no offensiveness. Mr. W. F. Ortloff agreed with the paper, but considered that the proposals it contained would be too expensive to instal.

MINLATON, October 6th.—Mr. W. Bennett read a paper on the livestock industry of Australia, in which he gave a short history of its foundation and growth, and some of the causes which had contributed to the great shrinkage in the number of livestock in Australia.

## WESTERN DISTRICT.

### MILTALIE (Average annual rainfall, 14.55in.).

October 7th.—Present: nine members and four visitors.

**Haymaking.**—In preparing ground for hay crop, observed Mr. D. Bagnell in a paper on haymaking, it should be fallowed to a depth of 3in. or 4in. and kept free from weeds. It should be harrowed after every good rain to conserve all the moisture possible. Great care should be exercised in freeing the ground of stumps and stones. He recommended sowing in the middle of April, if the ground were really suitable, with a bushel to the acre of either Golden Drop, Gluyas, or J. 4, and 60lbs. of super. When the crop was up, and had taken good root, it should be harrowed and rolled if necessary. He was averse to sowing wheat and oats mixed, and favored cutting a certain amount of each. That could be judged by the amount of twine used, and load for load of each placed in the stack, because it saved the second handling of mixing sheaf for sheaf when cutting chaff. In regard to the time for cutting hay he favored wheat and oats being cut in a well advanced stage when it was of a greenish yellow color. Sheaves should be stooked as soon as possible. The stooks should be oblong, four sheaves in width, each stook consisting of 30 to 40 sheaves, except in cases where labor was scarce and the hay could not be carted before harvest. In that case it would be better to make the stooks two or three times as large in order to prevent them being blown about and bleaching. When stacking hay in the open, stones or wood should be used for dunnage, logs being preferable, because they could be readily shifted as soon as the hay was removed. For a stack of wheaten hay containing 30 to 35 tons, the dimensions should be about 36ft. by 18ft. The weight could be gauged by the amount of string used, allowing 24 tons or 26 tons to the bale in a crop of average height. When building the stack, the middle should be kept fairly full in order that it might be 3ft. or 4ft. higher than the outside walls when commencing to make the roof. When roofing, he favored making the eaves by placing long sheaves with their butts outward about 9in. over the side of the stack. A finish should be made with the heads out, tying the top sheaves securely to keep them in position; a covering of about 1ft. of straw should be put on as soon as possible. Mr. L. Aunger did not favor placing the heads out on the roof of a stack, because it would spoil the best of the hay. He would make hay from oats, since they had to be grown every year. He would not place stooks in hollow ground lest they be spoiled by the rain. To save time in stooking, it was advisable to take as much as possible on the sheaf carrier. Mr. J. S. Jacobs considered that it was better not to grow oats and wheat mixed. Green hay made better feed. Mr. P. J. Eachen said that sufficient care was not paid to stooking. He favored cutting hay green.

### MILTALIE (average annual rainfall, 15.45in.).

November 18th.—Present: eight members and four visitors.

HARVESTING.—Commencing with the advice that all the machinery should be overhauled, and spare parts obtained to replace probable breakages, Mr. J. P. Story, in a paper on harvesting, proceeded to say that there were four methods of gathering the crop, namely, by use of the harvester, stripper and winnower, binder and thresher, and reaper-thresher, each of which had its advantages and disadvantages. A 5ft. harvester would cost £100, but, with a good team, a farmer could take off the crop himself, sew the bags up, and cart them to market. With a little additional trouble he could save the cocky chaff. However, the bags of wheat had to remain in the paddock until the crop had been reaped, and many of them probably not sewn up. They would, of course, lose weight, and if the ground were damp the bags would rot at the bottom. A reaper and hand winnower would cost about £100. The reaper did not require so many horses as a harvester and the upkeep was less. It was necessary to employ labor to clean the wheat, but the cocky chaff was saved and the wheat would not be standing so long in the paddock when bagged, and therefore would not lose so much weight. The binder and thresher would cost £150, but there was a binder on every farm, so that there would only be a thresher to buy. If three farmers bought a thresher between them, each could cut and stook his own crop. It would be necessary for each to employ a man for stooking, but they could all work together, carting, threshing, and stacking the straw. The weight and color of the grain harvested by that method excelled all others, and there was the stack of straw as a stand-by. There were seasons, however, when the crop was too light to bind. In that district the ground was too uneven for the cumbersome machinery of the reaper and thresher. Mr. J. S. Jacobs concurred in the view that wheat lost weight while left in the paddock. He preferred the stripper and winnower, because reaping could be commenced sooner, and would not lose weight in the heaps so much as in the bags. The binder would be too expensive, because of the price of string and the labor required. Mr. P. J. McEachen preferred the harvester, because it would save more wheat, and it was possible to save the cocky chaff. The binder and header caused too much work. Mr. H. R. Jacobs preferred the stripper to the harvester. Mr. W. E. Hier said that the bags were too dear to leave out in the paddocks to rot. After damp weather the white ants were very bad on the bags. Farmers should lay out a good piece of floor for harvesting. He preferred the stripper and winnower to the harvester, which blew out wheat. The only self-sown crop in that district was in a paddock which had been reaped by a harvester last year. Mr. W. G. Smith preferred the stripper to the harvester, though it might pay sometimes to cut portion of the crop with the binder and use the header. Mr. J. W. Story did not believe that the harvester wasted any more wheat than the stripper. Mr. L. Aunger referred to the great difference in the various makes of strippers. He favored the 7ft. damp-weather stripper with a five-horse team. The new makes of strippers were much lighter than the old sorts. After cleaning up it would pay to drive the pigs down the paddocks to the floors, which they would clean up thoroughly.

## ROBERTS AND VERRAN.

November 7th.—Present: five members.

Care and Management of Horses.—Stipulating first for a good stone stable, well ventilated, with a well-thatched straw roof, Mr. F. Imhoff, in a paper on the care and management of horses, proceeeded to urge that if one side of the stable were left open, it should be the eastern side, because less wind and rain came from that quarter. The yard for the horses should be on elevated ground, to ensure effective drainage. Horses should be tied up in their stalls. In feeding, the first feed when the horses came in from work should be of long hay, and the last feed at night chaff. In the morning and middle of the day crushed oats and bran might be given with advantage, because there was not so much time to eat it. A piece of rock salt in the manger was beneficial. A dose of Epsom salts once a week ensured good health. Clean straw for bedding should be provided every night, and each animal well groomed every morning. Medium draught horses were best for farm work, and for breeding a good docile mare should be selected, and should not be bred from until five years old. Mares should be kept in constant work until three days from foaling, but should not be used in places where they might be bumped or knocked about. A good stallion should be selected. Young horses required to be properly mouthed before being put in a team. Pipe collars were the best, and it was essential that they should fit well. When lumps or sores came on the shoulders, the horse should be spelled or the collar eased off. For scalded shoulders a false leather collar was advantageous. The hoofs should be coated with Stockholm tar every week, to prevent cracking.—Mr. F. Masters would give long hay for last feed at night, instead of first, and was averse to dressing the hoofs with Stockholm tar too frequently. Mr. W. McCallum favored a thatched roof with sheaved straw first, and then covered with loose straw, which would keep out the wet. Mr. A. F. Cowley preferred an iron roof, because straw generally leaked and was a harbor for sparrows and other vermin. The opening in the stable should be towards the north-east, because the wind from that direction was not cold, and rain seldom came from that quarter. He was against giving horses medicine frequently—the less medicine administered the better. Mr. W. Sharman favored an iron roof, because straw was leaky, and it was better for the horse to be in the open than under a leaking roof. He preferred giving horses chaff for both night feeds, because it gave them time to finish their feed and get sleep and rest, which they required after a long day's work.

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## YADNARIE (Average annual rainfall, 14.09in.).

October 11th.—Present: 10 members and one visitor.

Hints on Farm Management.—In a paper dealing with farm management, Mr. W. L. Brown observed that a systematic consideration should be given the financial aspect of the farm. An endeavor should be made to put in a sufficient area to provide, under average conditions, a return large enough to meet obligations. Care and economy should be practised, and some system of bookkeeping was necessary; that could be facilitated by making all payments by cheque. Haystacks or crops could be insured if the farm were situated in a mallee district. Mr. G. B. Kobelt considered time-payment necessary. Some well established farmers bought their machinery on the hire purchase system. Mr. J. H. Kruger said that taking the average of the district as the probable yield, was an evidence of sound judgment. Farmers should keep books of some sort. Some cash transactions could not be put in the heel of a cheque book and were lost sight of.

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## YADNARIE.

November 11th.—Present: nine members.

Sheep on the Farm.—A paper, contributed by Mr. E. C. Kruger, was read by the Chairman. The writer premised that it was rather difficult on a new mallee farm to keep sheep at once, but every farmer, after two or three years on the farm, should commence the rearing of sheep. About 50 six-tooth or full-mouthed Merino ewes off the shears would be the cheapest to start with, because young ewes were poor mothers. He would prefer to mate them with a good Dorset Horn ram. The Dorset Horn was a nice sheep, of big frame, with clean points, which was essential in that district. The pure Merino was known to be rather wrinkly, and too woolly about the head, necessitating more careful attention than was required for clean-pointed sheep, which were better doers than the pure Merinos. For wool Merinos were best; but it was necessary to take into consideration the sale of mutton, which was a large item. Ewes should be mated about the middle of November, and the ram allowed two months, which would secure an April-May lambing. The rams and ewes should not be too fat. Ewes might be mated when one and a half years old with fair results, but a ram should not be used until it reached the age of two and a half years. All ewes with blind teats should be set aside for killing. Lambs should be tailed when six weeks or two months old. It was unwise to run the rams with the ewes all the year, because there would be lambs dropped at shearing time, which was very annoying to the shearer, and often very unprofitable to the owner. Besides that, lambs dropped in mid-summer would not develop satisfactorily without some kind of green fodder. The best time for shearing in that district was from the middle of September to the end of October, and great care should be taken with the wool, because the presence of pieces of chaff and other rubbish greatly reduced the value. For small flocks it was unnecessary to skirt and class the wool extensively. All that was requisite was to remove the stained and short wool from the legs of the fleece. Bales should not be filled too tightly, or they would weigh too much and possibly spoil the sale.—Mr. W. Jericho said that it was not profitable on a farm to have only one lambing in a season. Mr. J. J. Deer preferred leaving the ram with the flock all the year, provided the flock was small. The second cross with the Dorset Horn ram was not profitable, because the wool was apt to deteriorate. Mr. A. Spriggs was in favor of summer lambs, for they kept going on the weeds which sprang up after summer rains. He had killed summer lambs weighing 54lbs. Mr. W. L. Brown said that sheep were as good as a cultivator in keeping down weeds. The Merino was essential to good wool. The small farmer's wool was not sold at per bale at the big wool sales. Mr. J. E. Quick said that a farmer would realise more money by selling a star lot of four or five bales and the rest separately than by making a class of, say, 14 bales.

CUMMINS, October 14th.—Mr. J. Durdin read a paper on the cause and effects of "Takeall," and suggested that there might be some connection between the swarms of flies, which infested areas attacked by takeall, and the causation of the disease. In the discussion which followed, Mr. W. Blucher said that the first effects noticeable in wheat affected by takeall was a net-like veil around the roots.

GREEN PATCH, November 10th.—Discussion took place on haymaking, members being equally divided on the question whether hay should be cut on the green or ripe side. It was considered preferable to build long stooks, if constructed firmly, otherwise the wind was likely to damage them. Hay should stand 10 or 14 days in the stook before carting. White Tuscan, Marshall's No. 3, and Baroota Wonder were the best varieties of wheat for hay, though oats undoubtedly gave the best return. Mr. G. Merchant produced a fine sample of Western Wolth rye grass, grown on a rich black flat, which had been flooded with the winter rains. He cut it for his cows three times. He advised anyone with rich black soil to give the rye a trial as green fodder for the cow.

KOPPIO, November 7th.—Extracts from a paper entitled "Wheat after Peas" were read and discused, the general opinion being that peas could be grown with profit on many portions of the farms. In discussing the class of soil most suitable for that crop it was agreed that light loamy soil gave the best results. Peas in that district should be sown fairly early. Members agreed that there had been a marked improvement in the yield of wheat paddocks which had been previously cropped with peas.

KOONIBBA, October 5th.—Mr. E. A. Hastings read a paper on horse breeding and rearing, in which he urged all farmers to breed horses now, and by the time they were ready for the collar, prices would not be below those now ruling. He preferred a nuggetty draught horse, and it should be sound. Great care should be taken that quality was predominant in the sire. Attention should also be paid to the hair on the horse's legs, a fine silky character indicating good quality of bone. Breeding did not interfere with the mares' farm work, for they could be worked almost up to the time of foaling. After the foal had been dropped, the mare should be put in a good paddock with abundance of feed to enable her to produce sufficient milk to thoroughly nourish the foal and give it a good start. The colt should be left with its dam for six months and then should be taught to feed out of the manger. It should be kept in good condition for the first two years, when a good foundation would be laid for life. Discussion ensued and the views of the writer of the paper were endorsed.

KOONIBBA, November 9th.—Mr. W. Port contributed a paper on the feeding and care of horses. In the discussion which the paper evoked Mr. Foggo said that he was against giving horses hay at night. He preferred short feed, because the animal would empty the manger and then rest. With hay the horse picked out the best portions and wasted the remainder. Members agreed that horses should be watered before feeding because it stimulated the appetite.

PENONG, November 12th.—A discussion took place on fallowing, in which it was urged that it was essential to harrow in warm weather to kill weeds, which, in many instances, would be otherwise only transplanted. Crops harrowed twice were noticeably cleaner than those only harrowed once. Fallowing enabled the farmer to prepare the land before the busy time of seeding.

YADNARIE, September 9th.—Mr. G. A. Dreckow read a paper entitled "Hints to a Beginner on a New Farm," and said that a beginner on a farm required to be in a fair financial position, and beyond that it was necessary to know the best use to which to put his finance. Many bought useless ploughs and other implements and poor horses, which were unfit to do the work for which they were intended. Many depended too largely on the coming season. Mr. Crossly said that with a fair amount of capital and a series of good seasons, a farmer should succeed. Mr. Deer said that the best equipment for a beginner was good judgment and a good pocket. On a new farm a man required plenty of pluck and determination, young horses, and good implements. Mr. G. B. Kobelt said that farming under existing conditions was very hard on the beginner. Mr. Crossly said that in that district a capital of £400 or £500 was required to commence with. Mr. Spriggs said that if a man had a good plant he could safely start on £200.

YANINEE, September 23rd.—Mr. L. Noble read a paper on water conservation, in which he urged the construction of dams at localities where the general convenience or farm would be best served. It was always well to provide for the conservation of more than enough. Provision for water three years ahead was fairly on the safe side. Excavations should be deep rather than wide to minimise the effects of evaporation, a breakwind would also assist in that direction. A tank or dam should not be placed in the lowest part of a depression, but a little above it in order that it might be securely closed and the water drawn off by a syphon to a trough. That avoided the pollution of water by the stock and was more economical in every respect.

YEELANNA, November 11th.—Discussion took place on numerous subjects brought before the meeting by means of a question box. In that way several matters of interest were debated.

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## EASTERN DISTRICT.

### (EAST OF MOUNT LOFTY RANGES)

### BOOKPURNONG EAST.

October 7th.—Present: 12 members and one visitor.

"GO ON THE LAND."—Under this title a paper was contributed by the Hon. Secretary (Mr. V. V. Crase). He dealt historically with attempts at decentralisation in the early civilisations, and referred to the influence of environment on the individual and the race. The importance of agriculture to Australia, he contended, was paramount, and the scope for its development most wide. The relative merits of the city bred and country bred farmer were discussed, and the conclusion reached that each had much to learn from the other.

BERRI, October 13th.—Mr. Walter Muspratt read a paper on cincturing the vine, in which he declared that the best time for the operation was when from 5 per cent. to 10 per cent. of the caps had fallen. Care should be exercised in making the cincture, and it should be protected from the sun by waxed calico torn into narrow strips, which would completely cover the cut. It was essential to cincture currants to enable them to be profitably grown, but it was inadvisable to make a practice of it with sultanas. He admitted that a heavier crop would set but it was at the expense of the vitality of the vine.

BRINKLEY, October 7th.—A paper was read by Mr. A. Martin on rolling scrub and burning off, in which he said that the most suitable time for rolling down scrub was August, September, and October, because at that period the mallee broke easily and a fair number of stumps were pulled up. If rolling were done not later than October, the shooots would make a good growth and the scrub would be thoroughly dry before burning off. A light iron tube roller was found most suitable in that district. Burning off should be done in February, or the first week in March, because that would give time to clear off any sticks left by the fire, before ploughing was commenced.

COONALPYN, November 9th.—Mr. J. Hill read a short paper on oats in mallee land. In the discussion which ensued Mr. F. F. Whitehead said that he would sow wheat instead of oats for the first two crops on mallee land. In a fair season, with the aid of a fire rake, almost as many shoots could be scorched as if oats had been sown. The third year he would sow oats and then fallow, which was always necessary after oats if wheat was to be grown. Mr. Whitehead then delivered an address entitled "Some factors of importance in the management of a scrub farm," and said that February and March were such busy months, with the completing of burning operations, fire raking, and harvesting, when the farmer should be on fallow or in other ways preparing for seeding, that it was almost impossible for a man to succeed alone. Two men in the long run would do three times the work of one. Where there was plenty of room to work it would be wise to have three men all told and aim at a big acreage. A haystack was essential, and provision should be made to handfeed stock. Two or three good cows should be kept, and one-fourth of the crop every year should be oats. Eleven horses were required, or at least a drill and cultivator team. Fallow made larger crop areas possible, because the bulk of the work was done the year before. It would pay to sacrifice a year's stump carting and expend the time on getting ahead with the work on the land. As soon as all roots were dead dressings of super., as heavy as could be afforded, should be put on the land. Marked benefits in pasture followed supered lands.

HALIDON, October 11th.—Mr. E. H. F. Muecke read a paper on the advantages of married life on the farm, which was well discussed.

KINGSTON-ON-MURRAY, October 21st.—A discussion took place on the destruction of cut worms. Several remedies were suggested. Arsenate of lead had not proved satisfactory. A string saturated with tar and tied around the vine or tree close to the ground, it was said, had given good results. The primitive method of scratching around the trees and vines and killing the worms with the thumb and finger had been mostly resorted to, and though slow, was effective.

MANTUNG, October 13th.—A visit of inspection was paid by the Branch to Veitch's Well Experimental Farm, where Mr. W. J. Spafford, Superintendent of Experimental Work, delivered an address on cultivation and the preparation of a seed bed. At the conclusion many inquiries were answered by Mr. Spafford.

MONARTO SOUTH, November 11th.—Mr. A. Harper read a paper on the construction of pigsties. He urged that a site selected for the sty should have fair drainage for rainwater. The ground should have a slope towards the back. The sty should be built of stone with an opening at the back for cleaning purposes. The floor should be bricked, and across the sleeping portion the bricks should be stood on end to form a low wall, which would retain the bedding in its place. The roof should be of straw, because it was cooler in hot weather and warmer when the weather was cold, and should project over the front to keep the rain out. If preferred iron might be placed over the thatch of the breeding pens. Stone cemented troughs were best, because they could not be rooted out of their places. A small sty for the young pigs to feed in should be erected alongside the main structure, with a small opening between, just sufficient to enable the little ones to pass in and out. Discussion took place as to the manner in which the sty should be managed at farrowing time. Generally the recommendations of the paper were approved.—Mr. A. Forbes read a useful paper entitled "Little Things which Count." Members agreed that the advice in the paper should be taken to heart, and strictly carried out.

MORGAN, October 13th.—A paper on farming on poor mallee soil, written by a member of the Claypan Bore Branch, was read and discussed.

MURRAY BRIDGE, October 9th.—Mr. W. J. Spafford, Superintendent of Experimental Work, delivered an address, "Diseases of Wheat Crops," which will be published in a future issue of this *Journal.*

PINNAROO, November 1st.—Mr. W. J. Spafford (Superintendent of Experimental Work) delivered an address which will be printed in a later issue.

RAMCO, October 9th.—Mr. R. Stanley read a paper. A growing tree would not stand the strain of bearing big crops, he said. It was a mistake to prune a tree hard for three years, and then allow it to grow. His advice was to prune it hard for five or six years, for by doing so both fruit and tree development would be secured. He had seen six or seven arms left on trees the second year, but no young tree could stand that strain for long. The tree should not be checked in its growth until five or six years old. To form a tree two years old, the second pruning should not leave more than three main arms. As the tree grew and spread, the spaces should be filled with secondary arms. To secure a good take and a good growth, the land should be cultivated once or twice between each watering. Mr. Lewis considered that young trees should be allowed to bear earlier, even if it shortened their life. In a general discussion, the consensus of opinion was that trees should be pruned hard for the first six years and not allowed to bear heavy crops of fruit.

RENMARK, November 9th.—A paper was read from a horticultural publication, dealing with the control of the export of pears and apples. Discussion ensued, and the subject was deemed so important that it was decided to suggest that it be included in the agenda paper for the Murray Conference, at Waikerie, for consideration.

ROSY PINE, November 8th.—Mr. R. T. Hay read a paper from a pastoral publication on horsebreeding. Mr. J. Docking said that the breeding of remounts was more profitable for the station owner than the farmer. Mr. F. G. Bonnin said he would like to see a Percheron sire imported into the State.

WOODLEIGH, October 19th.—Mr. E. Good read a paper on handling young horses, which provoked considerable discussion. Mr. H. J. Finnis, Acting Secretary of the Advisory Board, delivered an address on the advantages of the Agricultural Bureau, and Mr. D. F. Laurie, the Poultry Expert, gave an address entitled "Poultry on the Farm."

WYNARKA, November 11th.—Mr. A. J. Bartlett read a paper dealing with sore shoulders in horses. It was of the first importance, if sore shoulders were to be avoided, that collars should fit well, and in that respect, it was better that they should be a little tight rather than loose. Adjustable hames, which could be made to suit horses carrying their head very high or very low, were advisable. Horses which had done no work for some time were soft, and inclined to be fresh; unless checked and kept well in hand they would quickly develop sore shoulders. If driven steadily until they developed hard condition, the trouble would be avoided. The method of breaking in also had some bearing on the question, and he strongly advised putting a young horse in a wagon first. It was a dead pull, and taught a horse to pull steadily. Members agreed that there was little danger of sore shoulders with well-conditioned horses and well-fitting collars.

## SOUTH AND HILLS DISTRICT.

### BLACKWOOD (Average annual rainfall, 27in. to 29in.).

October 16th.—Present: 15 members and 17 visitors.

**Co-operation.**—Mr. F. Green (Secretary of Forest Range Fruitgrowers' Association) read a paper on co-operation. He contended that their present methods of marketing fruit were obsolete and should be improved. Except in a few instances the exportation of fruit was done by individuals, consequently there was great diversity in the methods of grading and the branding of the grades. The methods employed in marking the grades were startling in their variety, for no two men adopted the same marks for a particular grade. There was also lack of uniformity in packing and marking. The marks "A" and "AA" were all right if the fruit contained under the same marks was the same. For instance "A" could indicate 2¼in. apples, ''AA'' 2½in., ''AAA'' 2¾in., and so on, but the simplest method was to brand 2¼in., 2½in., 2¾in., &c., but each case should contain the grade marked upon it. In many cases, under existing conditions the 2¾in. grade often contained 2½in. to 3in. apples. The multiplicity of grades and varieties was against successful trading with oversea markets, and without co-operation that multiplicity would not be overcome. For instance, it was necessary for the individual to book space in the boats months ahead. He expected a certain number of cases of special varieties of apples, but, owing to the fruits failing to set or damage to the fruit due to hailstorms or winds, &c., could not fill the space with those particular varieties. Sooner than pay for empty space on the boats he filled up with several varieties and grades. With co-operation those conditions, to a very large extent, could be overcome. Many of the growers in South Australia did not possess large orchards, and consequently in an off season could not pack a sufficient number of cases to make a parcel large enough for export, whereas, with co-operation, if 30 members had only 10 cases each, they could make one fair parcel of 300 cases. As the larger exporters became known, the smaller man was forced off the market because he could not guarantee a continuous supply from year to year, whereas the bigger exporter became known and his fruit was readily bought, especially if the buyer were sure that fruit bearing his brand were true to description. At present fruit shipped was not always properly graded, for if it were considered that 2¼in. apples were the smallest grade that should be exported, and of that size 228 fruits filled the bushel case when packed on the diagonal system, conclusions could be drawn as to the grading and packing when 436 apples were counted in one case sent for export, and that was not an isolated instance. Quantities of apples were sent away which should never leave the State. The Commerce Act merely enforced correct trade description, and so long as the fruit conformed with the description on the case, it could be exported. The inspector should have power to withhold fruit unfit for export. Once a good name was lost it was difficult to regain the buyers' confidence. Good fruit should always be sent, not necessarily large fruit. A good 2¼in. apple was always sought after, but nothing smaller should be exported. The fruit should be sent in accordance with the requirements of the market on which it was to be sold. With co-operation one man controlled the export of the district, and passed all the fruit. The success of the scheme depended upon that man. It was necessary, therefore, to be very careful when the appointment was made. The duties of the manager were not always pleasant, because some growers' methods and fruit were not the best, and the manager needed to be a man of backbone, who could unhesitatingly reject inferior fruit. Once a brand secured a good name it was sought after, and parcels could be sold forward at very remunerative prices. That could only be accomplished by co-operation, except in the case of a big grower. By purchasing materials co-operatively great savings could be effected. The general practice was for the grower to purchase his few cases through an agent, involving the payment of the agent's commission, whereas, if bought through an association the mills allowed 2½ per cent. on 1,000 cases, 5 per cent. on 2,000 cases, and 7½ per cent. over 4,000 cases. The same applied to the purchase of wood wool and wrapping paper. One great objection to co-operation was that the grower did not see why he should pay for packing when he could do it at his home in his own time, but, at the end of the season, it would be found that the packing had been done more cheaply and efficiently at the packing sheds, because there was enough saved in the purchasing of materials to pay for the packing. The association should be managed by a chairman, five leading growers, and one paid officer, the secretary, who should be paid in accordance with the work he did, usually 1d. per case for the fruit handled. Cool stores were necessary in connection with the local markets, so that produce could be put in and taken out when necessary, thus avoiding the glutting of the markets. In Sydney the markets were municipal, and the cool stores formed one wall of the markets, and had elevators to the floor of the markets. When a glut occurred the excess of fruit and vegetables was stored and supplies regulated. The South Australian system of marketing was wrong. It should be done co-operatively. The scheme was too big for the whole State, but each community of growers could combine to have its own co-operative saleroom with a staff to run it. The produce sent to the saleroom would be unloaded, the driver would receive his delivery note and leave for home instead of being compelled to remain around the markets most of the day. It is necessary to be on the lookout for new markets, and in that connection the association had a great advantage over the individual. A quarter of a million bushels increase in the apple crop was recorded last year, and the quantity was increasing from year to year, so that growers required to be ever on the watch for improvements and new markets. In reply to a question whether carting apples loose in cases to the packing sheds would not bruise them, Mr. Green stated that it was only a few top layers of apples which rolled about that caused the trouble. A few bags put upon the top of the case held the fruit firmly. No trouble had been experienced when that had been done.

### FOREST RANGE (Average annual rainfall, 35in. to 36in.).

November 9th.—Present: nine members.

HINTS ON GRAFTING.—A paper giving a few hints on grafting was read by Mr. J. Green, who said that it was best to select the most suitable method of grafting and adhere to it. Continual changing militated against proficiency. For nursery and young trees the tongue graft was best, and to get the best results a commencement should be made early, the end of July being best for plums, but stone fruits should be budded. There were always some misses after budding, and they could be grafted successfully just under the ground. The same applied to cherries. Apples should be commenced early in August, and then the scions could be taken straight off the trees, but if not completed early the wood should be cut and heeled in the ground, because if the sap rose, there would not be a good take. When using the tongue graft the stock should be cut back-handed in order that when cutting the tongue it would lie in front of the operator. In that way the tongue to cut in the scion would also be in front of the operator. After grafting, about three turns of wax rag should be bound tightly round the graft. With a little practice 95 per cent. of success was not too much to expect. When cutting down old trees he preferred to graft on the small wood with the tongue graft, but if there were not sufficient small limbs he would take limbs up to 2in. through and cut slanting across, using the limb as a lever. Then the scion on both sides should be cut, making a wedge. The shoulder should be pressed against the limb to open the cut, and then the scion put in. After removing the shoulder the scion was quite tight, and it should be bound about twice round with wax rag. The limb should be cut off about 2in. away from the graft. If shorter, it might die back and spoil the graft. The following year it should be cut quite close. That made an excellent graft, and soon grew over. He had not had one blow off. Being put in on the top of the limb the saw cut was downwards, and the weather did not damage it so much. That graft could be used in very small limbs, and was pretty sure to take. Proficiency in those two grafts would fill all requirements. Mr. McLaren said that the tongue graft was the surest. Mr. H. Waters considered that the cross method was very serviceable. Other members endorsed Mr. Green's views.

### GUMERACHA (Average annual rainfall, 33.30in.).

October 9th.—Present: nine members.

DAIRYING.—Discussing the principles of dairying, in a paper on that subject, Mr. C. Jamieson, after insisting upon the necessity for pure-bred stock, expressed a preference for the Shorthorn, though he believed that the Jersey was the better creamer. The former, however, produced a bigger calf, and the cow was larger and quieter. The selection of a bull was all-important, and it would be found more profitable to pay £30 for a pure-bred animal than £10 for a "scrubber." Another essential was the testing of the cows by means of the scales and the Babcock tester. There was a difference of 80lbs. of butter per annum between some cows, and the poorer cow required about the same amount of food. One would show a profit of £2, and the other of £6, therefore as much profit was made from the one good cow as from three inferior animals, and only one-third of the labor and food was requisite. Dairymen should breed their own cows, and unless all were tested, it might happen that the least profitable animal was being bred from. Testing might be carried out by the purchase of a tester or by forwarding samples of milk to the Government Dairy Expert, the charge being only 3s. per cow per annum. Proper feeding was another essential. No matter how well bred the cow, its profitableness diminished if it were not properly fed. Dairymen should grow as much of their own fodder as possible, and to that end lucerne was one of the best foods for milch cows. Kale, mangolds, barley, and oats were also very useful for the production of milk. Bran and chaff, especially when they were as cheap as they were at present, should be extensively used for milk production.

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## HARTLEY.

October 12th.

A large number of members and visitors, including Messrs. G. R. Laffer and R. A. O'Connor, Ms.P., and H. J. Finnis (acting secretary to the Advisory Board), visited the homesteads of different members of the Branch. The majority of the holdings inspected were situated along the banks of the Bremer River, and particular interest centred in the various methods of water distribution that were in practice. The first place of call was the farm of Mr. F. Lehmann, where water was being distributed by gravitation over an excellent plot of lucerne, the water being run through a channel cut in the bank of the river for a distance of about half a mile. After partaking of lunch as the guests of Mr. and Mrs. Lehmann, the party journeyed to Mr. J. C. Sanders' holding, where water was being raised from a bore 306ft. deep by means of a 6h.p. engine, pumping into a 20,000gall. steel tank, at the rate of 800galls. per hour, and distributed by means of overhead sprinklers over a vegetable and fruit garden. At Mr. H. Reimer's property, also, overhead sprinklers were distributing water from the Bremer. The final place of call was the fine property belonging to Mr. B. Wundersitz. The crops here gave splendid promise, and the general appointments and appearance of the place were all that could be desired. After an inspection of the holding, the visitors were entertained as the guests of Mr. and Mrs. Wundersitz, speeches being delivered by Messrs. Laffer, O'Connor, and Finnis.

## KANMANTOO (Average annual rainfall, 17.90in.).

October 9th.—Present: eight members and two visitors.

**Co-operative Purchase of Dairy Bull.**—Commencing with the declaration that the bull was the main half of the herd, Mr. W. G. Mills, in a paper on the co-operative purchase of a dairy bull, continued that he would like to see all farmers in a neighborhood combine to purchase a really good beast. Each of half a dozen farmers or more, should pay £1 for each cow he wished to breed from. If two members had 10 cows each, two had six cows each, and two had four cows each, there would be a total of £40, which would be sufficient to purchase a good animal. He did not mean merely a big handsome beast, but one of a good milking strain, which should be the first consideration. The records of his dam, great dam, and great great dam should be secured, and only a bull with ancestors on the dam's side of excellence in milk and butter production should be purchased. Having secured the bull, the question arose as to its keep. He considered that one of the members of the co-operative scheme should take the bull and keep it, either in a stable or in a perfectly secure paddock. It would require to be well fed and attended to, which would entail both expense and trouble and probably the keeper of the bull would require to be rewarded in some way. The other members would bring their cows along to the bull when service was required. In a sparsely settled district, such as that, the driving about of the cows would be too big a proposition. To overcome that each member should have the custody of the bull for a certain period of the year, according to the number of shares he held. Such a scheme would provide better stock on the farm and make both masters and servants more interested in their work.

## LONGWOOD (Average annual rainfall, 37in. to 38in.).

October 7th.—Present: 12 members and two visitors.

**Orchards and Orchard Work.**—A paper by Mr. C. H. Beaumont, Inspector of Orchards, on orchards and orchard work, was read by Mr. J. C. Blakely. The writer of the paper said:—"I am sure that all present will agree with me when I say that it was never intended that fruit trees should be grown in any haphazard fashion, and it is necessary that every care should be taken in selecting the site of the orchard. The site means such a lot. We have to remember, when planting fruit trees, that we are planting for a lifetime, or, indeed, more than a lifetime. We should not be called upon to replant many of the trees every year or two. The proposed site for deciduous trees should have a good free soil, with clay subsoil. Trees may exist on sandstone beds or cold clayey gravel, which is a bog in winter and like cement concrete in the summer; but, unless they are placed in good soil the trees will not be fine and big, able to carry heavy crops of good-quality fruit, and it is only from such that profits are made, that is, in South Australia. The site should be sheltered, one to which the hot north wind and the heavy westerly gales will not have direct access, and, if possible, it should be where the rising sun will not strike immediately on the trees, when hard frosts are about, but will shine over the top of them for a little while and bring about a gradual thawing. Land with a gentle slope is best, so that cultivation may be done by horse or motor traction. Steep hills will, of course, grow good fruit if the soil is there, but the cost of working and of harvesting is prohibitive. Do not select a site for a house and then plant the orchard about to enhance the view. Think of the trees first; remember that it is from them that the livelihood has to be obtained. The home can be placed in a convenient spot near by. The preparation of the ground will depend on whether it is bare or covered with trees. It frequently happens that land which has been used for cereal crops in the hills is put into trees; such land should be ploughed and subsoiled as hereafter described, levelled off, and kept as a clean fallow for at least one season. Forest land must of necessity be cleared. Do not imagine that you are going to save time by planting your trees in holes dug in the middle of growing scrub; it is a waste of time, a waste of money, and a waste of trees to go about planting in this fashion. Clear the land first and grub out everything. Put the small bushes and branches into many little heaps, to be burned, keeping any useful firewood or sticks which will cut posts to be dealt with while the rubbish is drying—that is to be carted to convenient places for future use. Burn all the rubbish and spread the ashes by dragging a set of harrows, in which a quantity of brush is fixed, over the land. When grubbing big trees, care should be used to keep the top soil and subsoil apart, so that each can be replaced in its proper layers when refilling the holes. I desire to emphasise the necessity for making a thorough clearance at the first operation, so that it will not be a continual expense on the orchard for grubbing shoots. Any outcrops of stone or loose boulders should be removed from the land and placed in a handy position for roadmaking when required. The methods for blasting out or working out the stone do not concern us at present. The clearing should be extended at least a chain outside the proposed boundary of the orchard. After all the holes have been filled, the land will be ready for the first ploughing. This is best done with two singe-furrow ploughs of heavy build. The right sort of plough and the right sort of ploughshare and good horses, and men who know how to handle them, are wanted for this job. The leading plough should have a mouldboard on, and should turn the furrow to a depth of about 6in.; the second plough, without a mouldboard, following in the furrow, and stirring up another 5in. or 6in.; and so on, until the whole of the land is broken up to 11in. or 12in. in depth. This work should be done as early in the winter as is possible. Leave the ground in the rough for the winter, to soak and disintegrate. When the weeds start, and before there is any chance of the soil setting hard, thoroughly work the land with a cultivator, and level it, and at the same time work it to a fine tilth with a heavy set of harrows. If any special levelling is required, attend to it at this time. For the first season I am in favor of keeping the land clean and well cultivated; no weeds should be allowed, and a stirring should be given after every summer rain. By this means the land is sweetened and made ready for the trees. It pays to take every care in preparing the land. Even if it takes two seasons to do it, the trees will be worth double the hurried ones by the time 10 years have elapsed. After the land is prepared, it is advisable to draw out a plan of the orchard. Make it big enough to show all the trees clearly; put the rows in the most convenient position for future working, taking care to allow for any necessary roads and wind breaks. The best lines for your fence and outlets to the sheds and main roads can then be obtained. The fence should be completed before any planting is started. Fencing is a fine art, and no doubt many will not agree with my ideas; but any fence to be erected must be vermin proof and also cattle proof. To make it boy proof would be an advantage, but so far that is beyond the power of the average orchardist. I would recommend that the fence should consist of good strong posts, not more than 9ft. apart, and wire not finer than No. 8. The bottom wire should be 3in. from the ground, the second in the centre of the netting, the third at the top of the netting. Nine inches above the netting run a barb through, and 9in. above the barb another plain wire. The netting should be of 1¼in. mesh, 3ft. 6in. wide. It should be trenched into the ground at least 4in., and then thoroughly fastened to the wires prepared for it, including the centre wire. The gateways require to have special care given to them—they are danger spots. The gate should swing level, and the crossing should be paved with stone or with a faced log, on to which the bottom bar will close. The gate will, of course, be covered with a wire netting. There is room for a design for a good and strong orchard gate.''

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## MOUNT BARKER (Average annual rainfall, 30.93in.).

October 10th.—Present: 31 members and one visitor.

PRUNING.—Propounding the questions whether it was necessary to prune fruit trees, and whether it paid, Mr. J. Brinkley, in a paper on pruning, answered both questions in the affirmative. He said that it was possible to have much useless wood in the tree, one branch robbing the other, until eventually it would be unprofitable. A tree should be self-supporting after five or six years, and pay a small dividend to its owner. It would be unreasonable to expect the same tree and the same soil to produce first-class fruit year after year, when not one pennyworth of labor had been bestowed upon it. Under those conditions, it would not pay. It was necessary to give the tree a good start by setting out a strong frame evenly balanced, having, say, four main limbs. Those should be cut back to about 9in. in length. In the second year the new wood should be cut back to 4in. or 5in. In the third year the leading branch should be left 9in. or 10in. long, and the side shoots 4in. Those shoots would give the first return of fruit. It could then be seen whether the tree was able to balance itself. If not, it should be promptly given the necessary help. The tree should not be permitted to become too top heavy, a defect which might be easily remedied by taking out the leading shoots every other year, an operation which would help to force out the fruiting spurs. That process could be continued for years. It was a good plan to keep the tree low, because then it was easier to spray, it was better for the pickers, and the bad effects of the wind were minimised. In renovating old trees, the object was to thin out the worn-out branches or reduce the height of the tree, and care should be taken to make all cuts above side branches. That was very important. A projecting stump should never be left sticking up, because the probabilities were that it would die back. When the tree had lost its foliage, the pruner could see clearly each spur and lateral, and calculate its future value. Winter pruning was better and safer than summer pruning. Experiments in summer pruning showed that apples did well, but suffered from sunburn, and for that reason he was averse to the practice. The best time to prune was from June to the end of August, because the wounds healed over much more quickly and better. If the pruning were too early, too many water shoots would be produced. If large branches required to be removed—but there would be no such necessity if properly pruned from the beginning—they should be cut off in March or April, and covered with tallow or grafting wax. The main limbs of peaches should be so distributed that each limb was shaded and still received plenty of light. Each alternate lateral should be removed, leaving the medium sized and removing the strongest and weakest shoots. All wood that had fruited was thus taken out. Non-bearing trees should be pruned hard, making, say, a 30 per cent. reduction. Some of the runaway roots should also be pruned, which would assist the fruiting in the coming season. It was not possible to grow good fruit from the same soil every year, unless a supply of manure, ashes, lime, or bonedust had been cultivated around the roots of the trees. That was a splendid mixture for giving energy to the trees, and produced a nice dark foliage. Where there was a plentiful supply of rubbish, he recommended burning it and spreading the ashes around the trees. The heavy soil of the hills could not be given too much ashes or lime.

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BLACKHEATH, November 10th.—Mr. H. G. Pym read a paper on the working of the Agricultural Bureau, on which considerable discussion took place.

BLACKWOOD, November 20th.—Mr. R. Eglinton read a paper on the diseases of ferrets, in which he indicated the causes and symptoms of distemper, foot rot, and mange or scab.

CHERRY GARDENS, November 7th.—Mr. D. F. Laurie, the Government Poultry Expert, delivered an address on the breeding, feeding, and housing of poultry, and was accorded a hearty vote of thanks and appreciation.

CLARENDON, September 11.—Mr. J. Potter delivered an address on potato growing. He advised a thorough preparation of the soil before planting. Manure from cattle camps was best, and next to that horse manure could be recommended. The paper was well discussed.

FOREST RANGE, September 14th.—Mr. G. Quinn, Horticultural Instructor to the Agricultural Department, gave a lecture and demonstration of pruning and subsequently delivered an address on orchard manuring.

INMAN VALLEY, November 9th.—Mr. G. McCoy read a paper on overstocking, which was freely discussed, members differing as to the carrying capacity of land in the district, some urging that two to three sheep per acre might be carried, whereas others contended that three sheep to two acres would be heavy stocking.

MOUNT BARKER, September 6th.—Mr. H. Pope read a paper on hay and chaff, which he had also read at the Hills Conference, at Morphett Vale.

STRATHALBYN, November 7th.—Discussion took place on a variety of subjects; among others, on the best time for dipping sheep. The opinion was expressed that the extension of time for dipping until January 31st, removed the operation too far from shearing time. Anyone purchasing sheep then, would, if the sheep had not been treated, require to dip them, which was often very inconvenient.

URAIDLA AND SUMMERTOWN, August 7th.—Mr. J. A. Pope read a paper on buying and judging a horse and in dealing, amongst other things, with the feeding of the horse; he said that for a beaten animal gruel was one of the best things. A pint or, if the horse preferred it thick, a quart of oatmeal (or half flour and half cornmeal) should be stirred gradually into a gallon of hot water. The pail should then be filled up with cold water. If the horse hesitated about drinking, it should be given a mouthful of water. If the animal was very tired a quart of good ale would be beneficial, but under no circumstances should a horse be given a feed of grain or hay when exhausted. If the horse would take nothing else, it was well to turn down a bottle of sound ale, and rub it until dry and refreshed. Then it should be fed. A good grooming was nearly equal to half a feed. Mr. F. H. Stacey agreed with the paper in most things. He said that many people gave their horses medicine for complaints which they knew nothing about, and in many cases did more harm than good. Mr. C. W. Kessell said that it was difficult to feed horses regularly in that district, because they worked such irregular hours.

## SOUTH-EAST DISTRICT.

### GLENCOE (Average annual rainfall, 33.84in.).

October 9th.—Present: seven members and one visitor.

Preparing Wool for Market.—Dealing with the preparation of wool for market, Mr. J. E. Telfer, in a short paper, said that the grower required to make his clip as attractive as possible. All very heavy, matted, and discolored fleeces should be kept out, and as even a class as possible maintained. The wool should be well skirted, all dirty and sweaty edges taken off, and the sides turned in and rolled up from breech to shoulder. Where crossbred sheep were kept it would generally be found that three classes would be necessary, viz., fine, medium, and coarse. When classing wool the length of staple should be taken as a guide. If a fleece were on the fine side and of extra length it would be better to put it in with the coarse line. Care should be taken to keep the wool as clean as possible. No chaff or straw should be allowed to get in it. If a box press were used the wool should be put in carefully and well trampled before commencing to press. Not more than 350lbs. should be put into a bale. They should be branded on the top and on one side with the grower's initials and name of farm, also the description of the wool. The bales should be numbered from the first to the last bale of the clip. Stencil plates should always be used in branding, because they made a much neater brand than that done with a stick or brush. Branding the bales was very important, because the description of the wool was also put in the sale catalogue, and if the description were wrong it very often militated against competition. Mr. J. T. Halliday said that crossbred wool was difficult to class satisfactorily. He had classed his wool in three grades, but the agents had reclassed it into six, and demonstrated that wool which he considered first-class was not so. Mr. G. F. Ferguson said that for flocks of less than 500 sheep it was advisable to make only two classes—coarse, and fine wool—otherwise there would be "star" lots. Mr. A. Dow said that "break" in wool was often caused by bad management. Sheep were starved and then put on rich feed, which resulted in a break in the wool. Mr. Jas. Barry, in answer to a question, said that some years ago he could not sell his barley, so he bought sheep and fed it to them. They fattened quickly and returned profit equal to a fair price for the grain. Mr. J. Dow said that he had bought some of the same line of sheep as Mr. Barry, but did not give them grain, and whereas Mr. Barry's sheep were sold in prime condition, his (Mr. Dow's) sheep had not improved at all.

### KALANGADOO (Average annual rainfall, 33in. to 34in.).

October 14th.—Present: 11 members and one visitor.

**Marking Lambs.**—In considering what age a lamb should attain before the marking operation was carried out, care should be taken, counselled Mr. D. W. Tucker, in a paper on marking lambs, not to take the lamb too young, nor yet to allow it to become too big. Some breeds grew faster than others and could be marked younger. A trial made in marking lambs at four weeks and eight weeks, was in favor of the lambs marked at the later period, and at shearing time they were much bigger and in better condition. Attempts had been made to introduce the searing iron in tailing lambs, but experience showed that the cut healed more readily than the burn. The old style of castration was still the best. The knife should be clean and sharp and the lambs should be allowed a reasonable period in which to cool down after being yarded before being operated upon. Mr. T. Bott said he liked to mark the lambs as young as possible. At three weeks they were old enough. There were fewer losses when the lambs were small. Mr. D. E. Ellison preferred that the lambs should be somewhat older than three weeks. When they were stronger, they mothered much better. Mr. M. Rogers said that the cord should be taken out as perfectly as possible. The purse should be held firmly to prevent the caul fat being broken.

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### KONGORONG.

November 11th.—Present: 13 members.

**Summer Ploughing for Sorrel.**—In a paper dealing with the destruction of the weed sorrel Mr. F. Kemp said that he ploughed the land in February, and left it turned to the sun without harrowing for five or six weeks. After cultivation it was harrowed and drilled and then harrowed again. A good crop was obtained, the best results being secured from the places where the sorrel had been heaviest. Since then he had not been troubled very much by that weed. He was averse to harrowing after ploughing in that district, because the soil was liable to be blown away if it were at all loose. If it were allowed to remain rough the furrows and ridges afforded protection, and the sun dried up the roots of the sorrel. Mr. C. S. McLean had been troubled with sorrel notwithstanding summer ploughing. Mr. Kemp said that the ploughing should be done before the rain. Mr. F. Uphill inquired whether sorrel which was eaten off before seeding and kept down would die? Mr. T. Dixon said that it would grow as soon as rain fell. Mr. C. S. Atkin said that the spring tooth cultivator dragged the roots to the surface. If land were sown thickly immediately after ploughing and a double dressing of manure given the sorrel would be practically choked out. Mr. H. Aveling said that where sorrel grew the land required lime.

**The Horse.**—Mr. W. A. Aslin delivered an address on the horse, and dealt with the treatment of various ailments.

### KYBYBOLITE.

November 9th.—Present: 13 members and three visitors.

**Care of Farm Horses.**—A member contributed a paper on the care of farm horses, urging firstly the necessity for proper feeding. Working horses should be given three feeds of chaff per day, with oats added, if necessary. At night long hay should be supplied, because it required more mastication, thus aiding digestion and inducing better health. Farmers should keep the best-quality hay for their own use, and if rank crops were used, grain should be added. Horses should be watered before feeding. Grooming was essential in improving the horse's condition and maintaining its health, besides tending to prevent sore shoulders, which were frequently the outcome of neglect and carelessness. The collar should fit well and be kept in proper order. Each horse should have its own collar. After a few week's spell, horses should be put to hard work gradually. A good stable was indispensable, with plenty of room for the animal to lie down, and abundance of good straw for bedding.

Manufacture of Chemical Manures.—At a previous meeting an address dealing with the manufacture of chemical fertilisers was delivered by Rev. F. W. Brasher, who, after dealing with the sources from which the raw products were obtained, dealt in detail with the process of manufacture. At the close of the address a number of questions were asked, and answered by the speaker.

## LUCINDALE (Average annual rainfall, 23.32in.).

October 14th.—Present: 11 members.

Care and Attention of Dairy Cows.—The care and attention of dairy cows were very important, especially in winter, observed Mr. P. Burke in a paper on that subject. In that district the winters were usually very severe, and unless the cows had some protection they had rather a hard time. Rugging was advisable where the number of cows kept did not exceed three or four, but with more the labor and expense would be too great, and it would be necessary to provide shelter breaks such as pines and other good shelter trees, where the cows could camp on rough nights. Exposure to the cold and rough weather in winter seriously affected the milk and butter supply. The most important factor towards success in dairying was feeding. Provision had to be made for the maintenance of life, and also for the supply of milk, and to do that the cow required the very best food. A good winter fodder was essential, and that could be provided by sowing barley, rye, or oats on well-manured land to catch the early rains in April, or, better still, a small patch should be irrigated. It could be sown in March, and would be fit to cut in May. He preferred feeding off to cutting, because the cow produced more milk and did better when allowed to graze. Lucerne was a splendid fodder for dairy cows, and would grow well in that district with irrigation. Mangolds had proved to be the best food ration to provide a milk and butter supply, but they necessitated much hand labor and were not usually favored. A very important matter was to have the cows coming in at the right time, say April, when milk and butter were scarce. Over-stocking was a grave mistake. Mr. T. W. G. Secker favored rugging cows, because they did much better, and the yield of milk improved. Lucerne was the best fodder for the animals. Mr. J. Burke did not believe in rugging, because when he took the rug off much hair came away with it. He was averse to having all the cows coming in at one time. Mr. J. McInnes said that a good shed where the cows could obtain shelter at night was better than rugs. Mr. L. McInnes said that cows should be kept in as long as possible. He had kept a cow in for five years, and she freshened up every spring and kept in good condition.

## MOUNT GAMBIER (Average annual rainfall, 32in.).

October 14th.—Present: 17 members.

Tree Planting on Farms.—In a paper on this subject Mr. A. A. Kilsby said treeplanting was a great necessity, especially on the flat lands, where they should have a little more shelter for the stock. As a rule the Remarkable pine was the most valuable one to grow. These could be put 6ft. or 8ft. apart, with tree lucerne at the back of them. As the lucerne grew more quickly than the pines, it formed a break for the plantation. In droughty seasons they cut the lucerne down and gave it to the stock. Then the lucerne grew as an undergrowth. On the lighter land, and especially where there was sand drift, they strawed them and planted the pines in the straw. He planted out from 1,500 to 2,000 pines every year. By the time the straw was worn out the pines were up. They firmed the land, and the wind did not have the same effect upon it as it would otherwise have.—Mr. R. P. Pritchard gave approving testimony to the good work that Mr. Kilsby had been doing in the way indicated. He had not thought it was possible to reclaim the sandy land as he had done. He had tried planting rye on sand drifts, and pine trees amongst it. The pines were sheltered by the rye, and came up splendidly. For hills he thought straw would be much better than rye. Mr. D. A. Collins said the nursery officers advised planting sugar gums. At Moorak he thought one of the finest breaks was tree lucerne, planted in a square. The stock could thus get on any side of it. It was also good for shade, and improved the look of a property and enhanced its value. Mr. H. McCormick asked Mr. Kilsby if he allowed the pines to grow their full height, or whether he topped them when they reached a certain altitude. He thought they should be headed down when they were 8ft. or 10ft. high. Then they spread. As for lucerne, he had seen pine trees kill everything near them, and they would kill the lucerne. The best tree for shelter was the spreading cypress. It grew only 12ft. or 15ft. high, and spread. Mr. Kilsby said that on the good land he would advocate topping the pines, but in the lighter soils he would let them run up. They were a valuable timber. They planted the lucerne almost in the same row as the pines. He had not tried the spreading cypress. It would be difficult to get it to grow out in the paddocks. Mr. McCormick suggested the sheaoak, which was a fine shelter tree.

Promoting the Seeding of Grass.—Mr. H. G. Wheeler read a short paper on the above subject. He said that the result of leaving the grass untouched in one paddock during the spring was that one was seldom if ever short of feed. Most people argued that they would have abundance of green feed, say, that year, as they had drilled in one and a half bushels of oats per acre in their stubble paddocks. That was all very well, but unless there was a good 6in. to 8in. high stubble to protect it, and it was not overstocked previous to drilling, it would be found, unless favored with a good season, that considerable time would elapse before they were able to make use of it to any advantage, and only then by light stocking. By saving a paddock in the spring it could be used early in January, when the seed had ripened, because the stock would then trample sufficient seed out. By taking the stock out for about three weeks, when the autumn rains came, a green feed paddock would be provided, mixed with dry feed, and one that would stand fairly heavy stocking. Some farmers contended that they could not spare a paddock in the spring. What was the reason? Because most farmers were overstocked, and they required all their feed to fatten their stock during the spring. The consequences were that as soon as the spring was over the paddocks were bare again, and were robbed of their seeding. No doubt that was the reason the yields of grass hay were not so prolific as in previous years. One thing he wished to bring forward especially was that they often put stock in paddocks of green feed, and they had to wait two to four months before they could get any benefit from them. They would remember that on the Moorak Estate they fed their bullocks well in the spring, and took them out of the paddocks, and they had excellent feed in the autumn. That year they had not the good autumn rains, but if they had the good autumn rains they used to have the spear grass would be strengthened by the old grass, and then in a fortnight or three weeks after the stock had been taken out they would have good feed.—Mr. A. A. Sassanowsky said they had to consider the different varieties of ground, in order to get a good seeding in the autumn. There must not be too much growth on the ground, or the seeds would not germinate, through insufficient sunlight. He got the best germination where the spring grass was not too thick. Mr. R. Smith thought it depended on the kind of soil. On the good soils they could grow a lot of clover, but it would not pay to let a large quantity of it remain on the ground. It would only rot, and do more harm than good. If they left a light coating of, say, half a ton to the acre, it would be enough shelter for the next year's crop of grass. He did not believe in eating a paddock too bare. Mr. W. Holloway thought the idea of eating out a paddock bare was very poor policy. He had always noticed that where there was at least some grass left on the top, there was a much earlier growth than when it was eaten down bare.

Analyses of Soils and Lime.—Mr. Sassanowsky gave a detailed statement of the results of the analyses of soils and lime which were sent to the Agricultural Department about 12 months ago.

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## MOUNT GAMBIER.

November 11th.—Present: 17 members.

Closer Settlement.—A paper on closer settlement was read by Mr. A. A. Sassanowsky, in the course of which he said that it behoved all who had blocks to see that the land was put to its best advantage for the benefit of the country. He referred to areas from 20 to 40 acres, which were not used for residential purposes only in the district of Mount Gambier. Those small areas were generally taken up with limited capital, and the first few years were a severe struggle for the settler. His first aim should be a quick return on his money, and for that he must look to dairying. It would pay to build a stable so that the cows could be fed. Mr. Suter had pointed out times out of number that it paid to feed the cow, and he had given various rations suitable for all parts of South Australia. The cows were brought up twice a day to be milked, so the one building could do for the same purpose. The cows could be either fed before, after, or whilst milking, and no harm would be done if the cows were groomed, because a clean coat saved feed.

Comparing stable feeding with outside feeding, he said that in stable feeding the cow was under control, and could be fed according to the requirements of her condition. The cow was contented, knowing very well that her neighbor could not rush her, and she could feed at leisure. In outside feeding the food was either scattered on the ground or in boxes, and the cows moved about, the stronger ones robbing the weaker, which were, generally speaking, the best milkers, and that caused double loss—first by trampling the food in the dirt, and, secondly, on account of the weaker getting insufficient food to make milk. They could judge for themselves which was the most economical. The mainstay of the small producer must be the cow; but in conjunction with her the pig, the calf, and the fowls must be looked after. And the same motto would do for them—"Feed them well; look after them well." They would then pay well. The farmer, having made up his mind that dairying was his largest source of income, must grow food, in order to get the most from his land for the cows. In that respect the growing of root crops, such as mangolds, sugar beet, carrots, &c., from which heavy yields might be obtained by good treatment, was advisable. If water for irrigation could be cheaply supplied, the yields could easily be doubled, because those crops were grown in the summer and autumn. A paddock of lucerne might be advisable, but it was rather uphill work to grow it, as the climate in that district was too cold for it to grow successfully. Cereal growing, such as barley, wheat, and oats, was too expensive, because he would require to buy a complete plant that would do for a far larger area, and then run the risks of hot winds and the various pests which were detrimental to the growing of cereal crops. The making of ensilage should be one object that the settler should strive for, and for that purpose some cereal fodders could be grown: but he should take advantage of the natural spring growth of the local grasses, the mixture of which was very adaptable for the making of ensilage at very little expense. It would pay the small farmer better to buy chaff for his horse than grow it. All dry feed required for his herd, except bran or grain, could be made by cutting a paddock of grass for hay. Mr. M. Fahey said to be successful holdings must be subdivided into small paddocks and good fodder plants cultivated. Mangolds and carrots could be grown, but they required a great deal of labor. He preferred chou mollier and lucerne. These could be grown in great quantities if farmers could get water for irrigation at a reasonable rate. But they could not afford to pay 1s. 6d. per 1,000galls. If they could get water at a reasonable rate they could make a great deal more profit out of their land. Mr. H. G. Wheeler advocated giving more care and attention to the cows. If fed in stables they did much better, because the troublesome ones could be tied up and prevented from interfering with the quiet ones. Mr. J. Davidson said that a herd of ten good dairy cows should return from £140 to £150 per annum. Mr. G. H. Kilsby urged the necessity for testing cows. It was no use feeding inferior animals. Food should be preserved for the cow. In the spring they had a wealth of feed, which was wasted, but should be cut and stacked for the season when it was not so plentiful. Mr. J. H. Buck said that dairying was very profitable, but a good bull was a necessity. Mr. J. Keegan commented on the high price of water. Mr. H. McCormick said that under the irrigation rates water could be procured for 6d. per 1,000galls.

## MUNDALLA.

November 8th.—Present: 12 members.

**Fallow at Mundalla.**—Dividing his subject into three parts, viz., (1) time of starting, (2) depth, and (3) working, Mr. E. Knowling, in a paper on fallow and its treatment at Mundalla, South-East, said that fallowing should be commenced immediately after seeding, July and August being the best months, if it were possible to proceed with the ploughing. The earlier the land was fallowed the less was the liability to takeall. Dry ploughing, unless the weather in the succeeding spring was very favorable, encouraged the development of takeall. The depth varied according to the class of land. In loose land, if by ploughing it very deeply a little clay from the bottom could be brought up and mixed with the upper soil, it would set more firmly and produce a better crop, but if the clay were close to the surface it should not be ploughed too deeply. Only a little clay should be ploughed up each year, and when it was well worked with the upper strata it soon made good soil, but great care should be taken not to bring too much up at a time, otherwise the ground would be too cold in the winter and retard the growth of the crop. From 3in. to 5in. was a good depth for ploughing, according to the class of land. Working should be done before any of the weeds began to seed, and as dandelions in that district were about the first to seed, the cultivator should be started about the end of September in order to be finished early in October. In the class of land in that district he would not advise harrowing the land before it was cultivated, because it became too fine, and had a tendency to drift in the summer. The spring tooth cultivator was a good implement for working the fallow. The draught was light, and in stumpy land did not jar the shoulders of horses as much as most other implements. Mr. J. E. Staude agreed with Mr. Knowling as to not harrowing the fallow. He had received better returns by only cultivating and not harrowing at all.

### NARACOORTE (Average annual rainfall, 22.60in.).

October 14th.—Present: about 33 members.

POINTS WORTH KNOWING ABOUT POULTRY.—In an exhaustive paper on poultry raising by small holders, Mr. E. A. Holmes, after setting out figures indicating the importance of the poultry industry in the United States and Australia, said that the poorest and cheapest land was more adapted to success than high-priced land. Light sandy soil was one of the most suitable, being always free from water lying on the surface. On most farms or small holdings only pure-bred poultry should be used. The male bird that was always crowing, and the hen that was first off the perch in the morning and last to go to roost—always busy—were the birds to breed from. For egg-laying the White Leghorn and Black Orpington (laying strain) stood out from any other, if Government competitions were a guide. Every farmer or breeder should have at least two pens for breeding purposes. A yard, say, 16ft. by 40ft., would accommodate from 15 to 20 hens, which would be sufficient for one male bird. For breeding, the best-shaped, medium-sized eggs should be selected. None that had wrinkles on or showed marks in the shell when held to the light should be used. They rarely hatched. Chicks should not be fed for the first 48 hours. The first feed should be oatmeal for a week, then rolled oats for about two weeks more, then cracked wheat, and at a month whole wheat. Soft feed—pollard 2 parts, bran 1 part, mixed into a crumbly mash—could be given. Young cockerels should be penned away from the pullets when they began to show signs of activity. In fact, the male bird was better kept away from the hens at any time unless required for breeding. An unfertile egg was better in every way, and it would keep any length of time without being turned into what was called the "electioneering" egg. To control breeding chicks must be marked, and toe punching was the best. Hens after they were two seasons old were not profitable, and should not be kept except for breeding purposes. Bone meal was a good thing for growing chicks. It should be mixed up in soft mash, or it could be put in a receptacle to which they could have access whenever they wished. Green cut bone was also one of the best aids for laying hens, but it was not advisable to give it to chicks too young, as it was too forcing. Green feed was absolutely essential to the health of poultry, and especially to growing stock. Any green food was good, but the very best was young tender lucerne. In conclusion he gave a few "don'ts":—Don't set scaly-legged hens, as they will transmit it to the chicks; don't keep weak and weedy chicks, kill them early; don't overcrowd chickens; don't hatch more chicks than you have accommodation for; don't let cockerels run with your laying pullets; don't keep more cockerels than you require, market them; don't keep hens after two years old unless required for breeding; don't let sick fowls run with the flock; don't leave your fowls without shell and flint grit; don't keep drinking water in the hot sun; don't keep green cut bone more than a day before feeding it to the hens; and don't worry a setting hen, but feed and water her. Discussion followed, in which the views expressed in the paper were endorsed. In reply to questions Mr. Holmes said that he did not think there was more disease among pure-bred poultry than among the barn door kind. It was not advisable to mate cockerels and pullets from the same setting, but they could be mated with fresh cockerels or hens. The prolapse of the oviduct was probably caused by over fat from over feeding. The best cross for table birds was the old cross between the Game and the Dorking, but other good crosses were with the Plymouth Rock and White Orpington. It required five or six days after mating of the male and female for eggs to become fertile.

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CLARENCE GOODE,

*Minister of Agriculture.*

# POINTS FOR PRODUCERS.

### Mange in Horses.

The appearance on a 12-year-old draught mare of a patch on the top of the wither, extending down the shoulders, with the loss of hair and formation of a thick scale, the growth of grey hair, and subsequently the appearance of similar patches on the flanks and belly, has prompted a correspondent to seek advice as to cause and cure. The Veterinary Lecturer states that the symptoms quoted point to a bad form of mange, and he suggests the following treatment:—Stand in sun for half an hour, lather over with soft soap, let lather dry on; an hour later wash off with soda and water. When dry dress with benzine one part, olive oil four parts. Repeat dressing once a day, repeat washing once a week. If very obstinate, rub small quantity of blue mercurial ointment into the thickened scaly parts. Remember, the disease can spread over the body and to other horses.

### Fire.

The luxuriant growth of vegetation which has characterised this year renders it necessary that more than ordinary vigilance should be exercised to prevent damage from fire. It is to the interests of landholders themselves that the provisions of the Bush Fires Act of 1913 should be strictly observed.

This enactment provides that stubble must not be burnt between October 16th and January 31st, both dates inclusive, but firebreaks for stubble burning may be lighted during that period, after the following conditions have been observed:—1. The strip is not to be less than 2 chains nor less than ½ a chain wide. 2. Before lighting the fire the land alongside the strip to be burnt is ploughed to a width of 3ft., or cleared of all scrub, stubble, and other inflammable material to a width of 5ft. 3. Twenty-four hours' notice to be given to owners and occupiers of adjoining land if resident within five miles of the place intended to be burnt. 4. Four men must be present at the fire. 5. No such fire is to be lighted before 9 o'clock in the morning, and it must be extinguished by 9 o'clock at night. The burning of firebreaks or of stubble on Crown lands held under lease, agreement, or licence must, in addition to the foregoing, be preceded by 24 hours' notice to the nearest Crown lands ranger or police constable. Stubble may be burnt between February 1st and October 15th, both inclusive, under conditions 2, 3, and 4 above mentioned. No fires are to be lighted for stubble burning on a Sunday. Penalty, £2 to £50.

Scrub burning between October 16th and January 31st, both dates inclusive, is strictly prohibited. Penalty, £5 to £50.

Scrub burning between February 1st and April 30th, both dates inclusive, requires the following precautions:—1. Fifteen feet round the area to be burnt must be ploughed or cleared. 2. Twenty-four hours' notice must be given to adjoining landholders residing within five miles of the place intended to be burnt. 3. Four men must be present during the burning. 4. The fire must not be lighted before 9 o'clock in the morning. The burning of scrub, in addition to the foregoing, on Crown lands held under lease, agreement, or licence must be preceded by 24 hours' notice to the nearest Crown lands ranger or police constable in addition to any other notice. No fires are to be lighted on Sunday for scrub burning. Penalty, £2 to £50.

It is also advisable to note that smoking is prohibited within 20yds. of any stable, rick, stack, or field of hay, straw, stubble, or other inflammable vegetable, from November 1st to April 30th, except within a town, or with a pipe properly covered. Penalty, £1 to £10.

### Undesirable Aliens.

The year just closed, characterised as it was by a most luxuriant vegetative growth throughout practically the whole State, has not passed without producing its crop of undesirable weeds. At least three plants hitherto unreported in South Australia have been found flourishing. The "flea seed" (*Plantago Psyllium L.*) was first reported in last month's issue of the *Journal*, as also was the appearance of the poison hemlock (*Conium maculatum L.*). Another stranger to this State has now been identified by Professor T. G. B. Osborn, M.Sc., as *Allium rotundum*, a wild garlic from Southern Europe. This plant will spread by means of its seed, in addition to bulbils, and the Professor of Botany suggests that the best means of effecting its destruction would be to dig up and burn the whole, taking care not to scatter the bulbils around the main bulb. The occurrence of these unwelcome strangers only goes to emphasize the necessity for landholders keeping a sharp lookout for their appearance. Had they been taken in time, few, if any, of the plant pests which now cause such trouble in Australia would have offered much of an obstacle to the individual landholder or to the State; but some have secured such a hold that their eradication is an economic impossibility, certainly to the individual, and probably to the State. The greater the efforts made to restrict this class, the better for all concerned.

### Water for Poultry.

The water content of the body of a fowl is 65 per cent.; this shows that fowls, to be kept in health, must have water, so that all the organs of the body can function normally. At all times there should be an ample supply of clean, cool water, shaded from the rays of the sun, in a thoroughly clean vessel, and so placed that it is free from contamination. Dirty water vessels make a fine breeding ground for various disease organisms. Ducklings must have drinking water day and night. Thirsty ducklings will drink too much water, which affects the brain and so causes staggering and speedy death. Scald the water vessels frequently, and disinfect with a solution of bluestone (copper sulphate) 2oz. to 1gall. water. N.B.—This is poisonous.—D. F. Laurie, Poultry Expert.

### Ringing Fruit Trees.

The practice of removing a complete ring of bark from fruit trees was referred to in the December issue of the *Journal,* mention being made of the results of experiments conducted at the New York Experimental Station. The noticeable improvement in the bearing of oranges in South Australia was also remarked. Apples also have been subjected to ringing in South Australia, and Mr. W. H. Hughes, of Longwood, practised the system on some trees of the Nickajack variety some ten years ago. That grower put two cuts, ⅛in. apart, through the bark of the trees, and removed the strip between the cuts. The operation was performed when the blossom began to fall. It was important, Mr. Hughes considered, that the cuts should not be deeper than through the bark, and if the weather were warm, he advised tying a strip of bagging over the wound to protect it from the rays of the sun. At the time the first test was made, one tree of a lot of eight was chosen for treatment. The treated tree yielded more fruit the season directly after treatment than was gathered from the remaining seven untreated. Needless to say, these were subjected to ringing the next year. All the treated trees are still bearing well. However, Dunn's Seedlings were also treated, but not successfully.

Mr. J. Roebuck, also a member of the Longwood Branch of the Agricultural Bureau, ringbarked a Gravenstein apple in the limbs ten years ago. Prior to treatment it had not averaged a return of one case per year, but immediately succeeding the ringing it yielded 13 cases, and since then has returned an average of nine cases annually.

A vigorous growing Northern Spy apple was ringbarked by Mr. W. Nicholls, and the result was very satisfactory.

## GROWING ALMOND KERNELS.

"The pits or stones of all stone fruits should be planted in this climate as soon as the ground receives its first soaking in winter," says the Horticultural Instructor (Mr. George Quinn), in reply to an inquiry in relation to growing almond kernels. "They should be covered with loose soil to a depth varying from 1½in. to 3in., and the surface of this should again be covered with an inch of mulch of litter or short manure before the ground has had time to dry out and become encrusted in the spring. Almonds as a rule come up freely in the early spring if planted as described above—that is, they may be expected to appear in three or four months from planting. If the season is advanced the kernels only may be set out; but, of course they should not be split or crushed badly. It may be remarked that one could hasten the germination of the nuts by burying them in a box of moist sand in the summer, say, in March, and keep this moistened until planting time, when they can be carefully shifted out. This will tend to soften the sutural joint of the two holes of the nut, and cause it to admit moisture to the kernel, which contains the germ just inside its tapered end."

# INQUIRY DEPARTMENT.

**Any questions relating to methods of agriculture, horticulture, viticulture, dairying, &c., diseases of stock and poultry, insect and fungoid pests, the export of produce, and similar subjects, will be referred to the Government experts, and replies will be published in these pages for the benefit of producers generally. The name and address of the inquirer must accompany each question. Inquiries received from the question-boxes established by Branches of the Agricultural Bureau will be similarly dealt with. All correspondence should be addressed to "The Editor, *The Journal of Agriculture*, Adelaide."**

## VETERINARY INQUIRIES.

[Replies supplied by Mr. F. E. Place, B.V.Sc., M.R.C.V.S., Veterinary Lecturer.]

[Extraordinary pressure on space has rendered it necessary to very considerably curtail the inquiry department. Replies to those questions of more general interest only have been published; however, every query received has been replied to through the post.—Ed.]

"V. M.," Parilla, has foal troubled with soreness at mouth and coronets; pus, and likelihood of losing hoofs.

Reply—This form of acute stomatitis occasionally attacks foals, and it is quite possible that the hoofs will slough, but will be renewed in time if it is worth while keeping the foal about. Treatment—As much tartar emetic as will lie on the point of the small blade of a penknife twice a day on the tongue, and dress the sores with dry boracic or a solution of Condy's crystals. Treatment may be discontinued after a week and repeated later for another week if necessary.

"A. C. G.," Lameroo, has a foal, three months, with crooked legs.

Reply—These will improve as time goes on. Give a tablespoon of syrup of phosphate of iron twice a day for a month or so. The foal will probably take it mixed in a little crushed oats, or if it has to be drenched, in a little honey and water. The swelling under the jaw will probably disappear in time.

"W. M.," Moorlands, writing in regard to Mid-York. pigs, asks:—Are there two types? Would a straight nose condemn? Do small blue-black spots on skin under hair prove the pig is not pure bred?

Reply—As the middle white is derived from the large and small, there are the two types which favor the one or the other, generally leaning towards the large. The nose of the middle white is judged to be more turned up than that of the large. In the large black spots are grave objections, in the small blue spots are looked upon as a sure indication of a cross, so in the middle they would be looked upon with great suspicion.

"C. J. D.," Harrogate, has a Jersey cow, 8 years, with lump at back of udder size of hen's egg. At first calf (2½ years) was very stiff behind. At second calf lump was first noticed about as big as an almond, and disappeared under iodine treatment. With fourth calf is as big as egg. No pain, and not noticeable when cow is dry. Not yielding to iodine.

Reply—An enlargement of supramammary gland, with an interesting history, because it points to tuberculosis or actinomycosis, probably the former. As there is suspicion of such a disease it is necessary for you to report it to the Chief Inspector of Stock, Adelaide, who will send an officer to report after investigation. In the meantime the cow should be isolated from others, and the milk boiled well before being used even for pigs.

Unsigned letter, Stansbury, writer has a mare 18 years, with greasy heels while suckling.

Reply—A tablespoon of Fowler's solution of arsenic once a day in feed for three weeks. The juice of half a lemon applied to the heels daily. Regret we cannot reply direct owing to want of signature to letter.

"C. M. W.," Netherton, seeks information in regard to foals dead at birth, or dying soon after.

Reply—This year there has been a regular epizootic of a disease known under various technical names, such as *Omphalothrombophlebitis pyelitis*, and so forth, which is caused by a sceptic germ attacking the foal in the womb and upsetting its constitution; should it be born alive it generally develops abscesses of the navel or joints so that the disease is then called navel or joint ill. Under those names it has frequently been referred to in these replies recently. Little can be done to prevent its occurrence, as the mares show no definite symptoms to the layman's eye, and a preventive inoculation would require the constant presence of a trained veterinarian. Fortunately, when it has been rife in one year, it is seldom so for some to come. The last serious outbreak in this State was about six years ago.

"J. B. M." advises that a calf was born blind, with thick, dark skin over eyes; very weak and small.

Reply—There is probably congenital disease which has caused the blindness, and treatment is not likely to be profitable, but if so inclined relief may follow the daily application of a solution of nitrate of silver in distilled water; strength 2 grains to 1oz.

"J. B. M." also has a cow which does not thrive though on good feed; very poor, and not much milk.

Reply—The symptoms are too indefinite to give an opinion on, but they are somewhat like those of tuberculosis, and it would be well to advise the Chief Inspector of Stock, Adelaide, who would send an officer to investigate.

"P. W. H.," Murat Bay, reports that a horse (buggy) hung back, reared, fell backwards, tried to get up, but scrambled along with nose on ground like a beast shot a bit too low. When bleeding at nose stopped, got up, staggered, and eyes dilated as if blind. In dark they glared, lifts legs very high, and smells way; does not seem to see light at night, but if held very close winks very slightly.

Reply—An excellent description of injury to the base of the skull from striking the ground with the poll. The blindness may be permanent, but is likely to disappear in a few weeks if the nerves themselves have not been injured. Treatment—Turn out in a shady paddock for three months, and if fed, give 10 drops tincture arnica once a day for three weeks.

## CHICKEN POX.

The occurrence of scabs on the beak and mouth of chicks prompted a correspondent to seek information on this matter. He reported that the trouble eventually extended to the eyes, the birds subsequently dying.

The trouble is known as chicken pox—a fungoid parasitic affection—air borne, says the Poultry Expert (Mr. D. F. Laurie). Treatment consists in bathing the affected parts with vinegar and water, equal parts. After drying with rag, one of the following mixtures should be applied:—1. Carbolized glycerine, 5 per cent.; or 2. Iodoform 1, vaseline 20 parts. All birds should be given some Epsom salts in drinking water, a tablespoonful to 1 gall. water.

A preventive measure is to apply kerosine 1, olive oil 4 parts, with rag, to the head, comb, and wattles of all birds.

# ON THE SCOPE IN SOUTH AUSTRALIA FOR THE EXTENSION OF OLIVE GROVES.

## AN OPENING FOR THE EMPLOYMENT OF RETURNED SOLDIERS.

[By Arthur J. Perkins, Director of Agriculture.]

### I.—INTRODUCTORY.

Quite recently attention has been called in the press to the desirability of employing returned soldiers in extending our olive plantations. The general question of taking advantage of natural conditions eminently adapted to olive-growing, has within recent years been much in my mind; whilst on the other hand, over past months I have been endeavoring to formulate various schemes which should lead to the profitable agricultural employment of returned soldiers. Hence it is from both these points of view that I now have the honor to submit the following notes and suggestions.

In the first place, I feel that I must preface these remarks with the statement that although I can lay no claim to being an expert, I am able to speak of olives and olive trees from the standpoint of some degree of personal experience. And I do this because I wish to make it clear that my views, whether right or wrong, are not merely the results of untested theoretical musings. I am, in fact, relying both on my knowledge of local conditions, and on personal experience acquired in earlier years in Mediterranean countries, in which for many centuries the olive tree has proved a source of inexhaustible agricultural wealth.

### II.—LOCAL POSITION OF THE INDUSTRY.

What is the position locally? Excellent, one would imagine, from the standpoint of our oil-makers, with oil at 13s. per gallon, wholesale rates; absolute stagnation, on the other hand, from the point of view of the State. And as an advocate of the extension of olive-growing in South Australia, on the broadest and widest lines possible, I shall have to show that both the individual and the State stand to gain much by it.

Briefly speaking, I am satisfied that whilst we have gone to the length of proving the complete adaptability of the olive tree to local climate and soil, we have not yet given it the slightest opportunity to demonstrate its great economic value. And unquestionably, the fact that olive trees do not come into reasonable bearing until their tenth and twelfth years is mainly responsible for their consistent neglect by a people whose inherited habits do not include olive oil among the necessaries of life.

Our unsympathetic treatment of the trees is perhaps another factor which has kept in check any tendency towards healthy expansion. We seem to have imagined that the olive tree could be grown to commerçial advantage under what may be termed ordinary forest treatment, whilst we have overlooked the fact that it is essentially a tree of the orchard or cultivated grove; and that for commercial success it demands both regular tillage and individual cultural attention. Unfortunately, however, many among us who, in moments of temporary enthusiasm, have attempted to grow olive trees, have certainly not realised these facts; and their ill-success must have acted as a deterrent upon others. If the olive tree is ever to become a powerful economic factor in our midst, we must endeavor to forget that we ever tortured it into a hedge plant, or systematically neglected it as a forest tree. We must, in fact, be prepared to put work into the land which carries the olive tree.

## III.—ADAPTABILITY AND GENERAL HARDINESS OF THE OLIVE TREE.

Although olive trees thrive in good, deep, rich soils, and under favorable conditions of rainfall, it is not in conditions such as these that we are likely to derive maximum economic advantage from them. Wherever natural conditions are abundantly favorable to general agricultural operations there is no need to call in olive trees to the rescue. On the other hand, the exceptional hardiness of olive trees when faced with abnormal heat and drought is often overlooked; indeed, there is probably no other cultivated plant that is equally drought resisting. I do not, however, wish for a moment to imply that the fruit yields of olive trees are equally heavy in years of drought and in those of plenty. Such, indeed, is very far from being the case; at the same time, whilst extreme drought may at times compromise the yearly crop, the trees themselves, nevertheless, given intelligent treatment, do not suffer to an appreciable degree, and speedily return to normal yields so soon as drought conditions tend to fade away. It is the reasoned recognition of this fact that has placed the great olive groves of Tunisia, with which I am personally acquainted, not in the north, where rainfall conditions are satisfactory and cereals are grown to advantage, but in the south, almost on the border of the Sahara Desert, where cereals cannot be grown to any great extent.

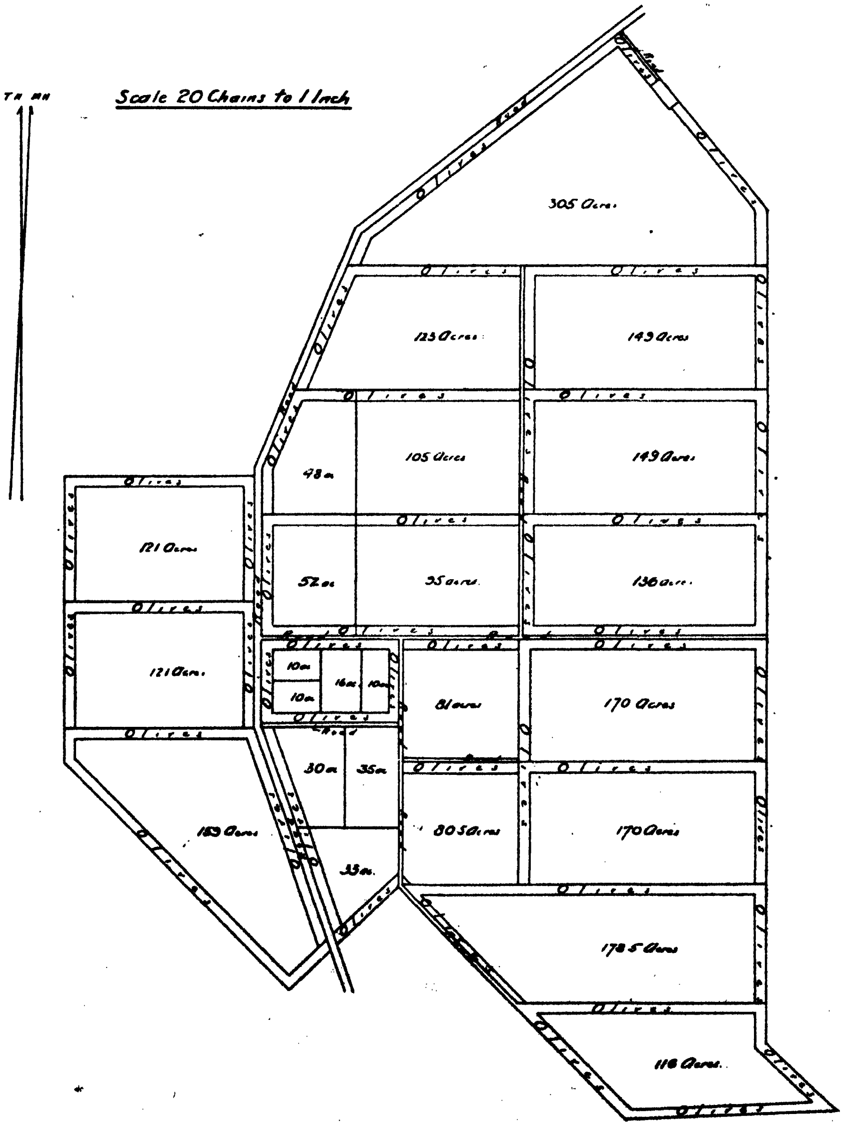
Hence I am of the opinion that if we are to take full advantage of the economic possibilities of the olive tree, it is chiefly in districts of uncertain rainfall that we should endeavor to establish it—in those districts in which farmers are regularly and periodically compelled to struggle with more or less droughty conditions of climate. I believe the olive tree to be very well adapted to conditions obtaining over the *central and northern hundreds of Eyre's Peninsula, over the mallee hundreds of counties Buccleuch and Chandos, and those of the Murray Valley; in fact, in any of our light rainfall cultivated mallee districts in which the soil is adequately provided with lime.*

## IV.—THE LAYING OUT OF OLIVE GROVES.

In most olive-growing countries it is customary to lay out the groves on very much the same lines as our own orchards, only on a larger scale, *i.e.*, in more or less regular compact blocks. In some cases the olive trees are systematically associated with other crops, such as cereals, vines, etc.; in others again their screening and sheltering powers are turned to the advantage of more delicate types of vegetation.

What is likely to be the best policy for us here in South Australia? In this connection I believe that we should endeavor to extract from our olive plantations every possible advantage they can offer. Nor can I see any particular advantage in building up with care a small coterie of olive growers, however valuable to the State their individual efforts may be. I am persuaded that every farmer in the districts I have mentioned above could and should associate olive-growing with his other normal pursuits. In the circumstances, therefore, we can ask from the olive tree something more than the mere production of fruit, however profitable the latter may be. We are all conscious that with us settlement of the country has hitherto meant little less than the indiscriminate felling and burning of all timber in sight; and it is much to be feared that before many generations have sped by ours will be a comparatively treeless country. Even now when the mallee farmer has finally subdued the bush, and finds his land more or less wheat-sick, his subsequent endeavors to associate livestock with the growing of crops are hampered by the complete absence of natural shelter of any kind; and his livestock operations suffer in proportion. I believe that a judicious use of the olive tree would go a long way towards remedying this evil. How this can be done I am endeavoring to illustrate on the Eyre's Peninsula Experimental Farm, at Minnipa. The accompanying illustration shows not what has been done, but what we propose doing, and are indeed gradually endeavoring to do. It will be noted that we purpose surrounding each field with a regular belt of four rows of olive trees, planted 40ft. apart; this will give us

Eyre's Peninsula Training Farm
Subdivided into Fields, bordered with 4 rows of
Olive trees 40 feet apart — 520 Acres.



eventually 520 acres of olive trees on a farm about 3,000 acres in area. Hence, instead of square or rectangular groves, we shall have long, narrow ones, acting as shelter and windbreaks throughout the length and breadth of the farm. It is quiet true, of course, that from this point of view a couple of rows of trees might prove almost equally effective; in the case of the smaller number, however, a fatal tendency to neglect tillage operations whenever the field itself was out of cultivation would generally make itself felt; and since both yield and profitableness of olive trees are always proportional to the care bestowed upon them, such neglect would in the long run tell against any important extension of the industry. In brief, I feel convinced that whilst four rows of trees, covering a depth of 160ft., would be looked upon as a regular grove, and tilled accordingly, there is danger that two rows would in time degenerate into mere breakwinds, and be neglected accordingly.

It will probably be objected that the fencing off of these long, narrow strips will prove tolerably costly, relatively to more compact blocks. This undoubtedly will be the case; it should not be overlooked, however, that we are asking the olive trees to play a double role, namely, to produce olives on the one hand, and to develop shelter for livestock and crops on the other. In any circumstances, when a breakwind is planted around a field, one cannot avoid protecting it by a double line of fencing; this is part of the price we pay for its shelter. In our particular case the breakwind happens to present the advantage of being directly reproductive; and if an objection is to be made of the unavoidable cost of fencing, we shall be compelled to ask, by way of rejoinder, whether the establishment of breakwinds is to be considered essential to progressive farming or not? Personally, I have no doubt as to what is the only possible answer.

## V.—STATE MEASURES ESSENTIAL TO THE DEVELOPMENT OF THE OLIVE OIL INDUSTRY.

In a country such as ours, with no past agricultural traditions in the background, the years of patient waiting which the would-be olive grower cannot hope to avoid must form an insurmountable obstacle to any appreciable local extension of the industry; and particularly so in those districts which it is best calculated to serve. Hence, in my opinion, notwithstanding the admitted existence of excellent local natural conditions and the undeniable prospects of great economic good, we cannot hope ever seriously to develop into an olive-growing people, except under the stimulus of very definite and very vigorous State action. What shape and what direction State action should take in this connection remain yet to be considered.

1. It would be much to the advantage of the State if olive-growing could be forced upon new districts in which it is as yet unknown, and in which it would prove a standby to settlers both in prosperity and adversity. Now, it appears to me that in cases of this kind the first assurance that the would-be planter will look for must have reference to the adequate marketing of his fruit, when in the distant future his trees come into bearing. Hence, if Government is duly impressed with the real economic value of the olive tree, and is anxious to secure its practical recognition by settlers, the very first step to be taken should cover a binding guarantee to planters that they will not be faced with marketing difficulties when, after many years, their trees come into bearing. I fail to see that appreciable planting can be anticipated unless some such guarantee is given. I suggest that Government should undertake that *in any new district in which olive-planting is taken up on an appreciable scale, the fruit, when available, will be taken over at full market rates for crushing in State factories, if the facilities of private enterprise were to prove inadequate to the purpose.* And should effect be given to such an undertaking, it would result not only in supplementing advantageously existing manufacturing facilities, but additionally, it would put a check on undue depreciation in prices of the raw material which always follows lack of competition among manufacturers.

*Further, in districts in which the olive plantations are unavoidably distant from State or private factories, special railway concessions should be made for the carriage of ripe olives.*

2. *I suggest that Government offer to new planters a yearly bonus of 10s. to 20s. per acre planted until the trees attain their tenth year.* This bonus should be allotted at the end of each season, say, in March, and only subject to the issue of a certificate from the Department of Agriculture to the effect that the olive groves have, in the first year, been well and carefully laid out and adequately protected against livestock and vermin; and, in the second and subsequent years that the olive trees are being regularly submitted to such tillage and cultural attention as the Department may prescribe from time to time. The slightest neglect in any direction should lead to the immediate withdrawal of the bonus.

## VI.—SYSTEMATIC PLANTING OF OLIVE GROVES UNDER STATE CONTROL.

It seems probable that proposals such as these will induce a few new settlers to take up olive-growing on a limited experimental scale; and whilst I hope that wherever conditions are suitable, Government farms will be able to show the way in more adequate manner, I cannot anticipate that the industry is likely to receive therefrom for many generations to come an impulse calculated to convert us into an olive-growing community in the course of a few decades. And if we have any faith in the industry, it is some such ideal we should always endeavor to keep before us. Hence, it is with this object ultimately in view that I very respectfully submit the following concrete scheme, *with which, in my opinion, could with very great advantage be associated returned soldiers, so soon as they become available in sufficient numbers for the purpose.* For the sake of clearness, I have summarised the details of the scheme in a series of propositions.

### (A) Encircling Belt to be Reserved Around Future Sections.

In the case of all future allotments of land in mallee districts, or in other districts suitable for olive-growing, the Crown to reserve the absolute right to resume, on 12 months' notice, a belt of land encircling the section to a depth of not more than 400ft. from boundary fences. Provision would naturally be made to allow owner of land usual right of way to and from his property through the encircling belt.

### (B) Encircling Belt to be Gradually Planted to Olive Trees.

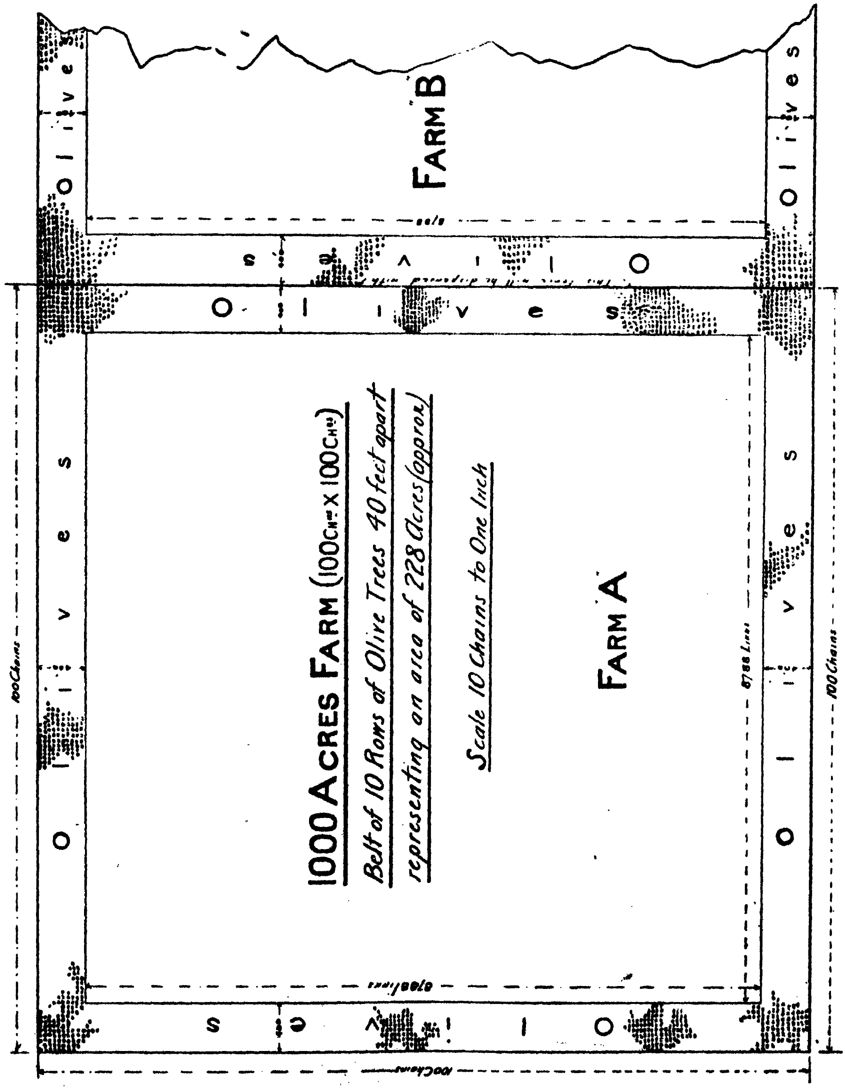
When the maximum area is resumed it is proposed that this belt of land should be planted to 10 rows of olive trees running parallel to the boundary fences; or to a less number of rows, if circumstances rendered it advisable to resume less land.

The ultimate aim, therefore, would be to surround all mallee farms with a complete belt of revenue producing and shelter yielding olive trees

If we assume a 1,000 acre farm to be a regular square (100 chains x 100 chains) an encircling belt of 10 rows of olive trees would cover an area of about 228 acres, exclusive of right-of-way outlets. This is illustrated on the accompanying diagram. In cases of adjacent farms, contiguous belts would be 800ft. deep, and include 20 rows of trees; and the cost of the central dividing fence would be avoided.

### (C) Deep Encircling Belts Effective Against Wind, but less so than Field Breaks.

Broad belts of this character completely encircling farms will not perhaps afford shelter as complete and satisfactory as the shelter I anticipate from the narrower belts surrounding the individual fields of the Eyre's Peninsula Experimental Farm. At the same time the State could hardly be expected to surround individual fields with shelter belts; such an undertaking would be both costly and inconvenient. I feel satisfied, however, that if individual farms in large districts are regularly separated one from the other by broad belts of olive trees, the violence of local winds will to a very great extent, be broken, and a large measure of protection to both crops and livestock will be insured. It will always remain open to farmers to surround with trees their individual fields, should they think it necessary. Indeed, it may be suggested that the State forego the right to resume the land if the owner should undertake to surround his individual fields with olive trees on the lines indicated for the Eyre's Peninsula Experimental Farm.


FARM B
Olives
Olives
Olives
Olives
Olives
Olives
1000 ACRES FARM (100 Chns X 100 Chns)
Belt of 10 Rows of Olive Trees 40 feet apart
representing an area of 228 Acres (approx.)
Scale 10 Chains to One Inch
FARM A
8788 Links
8788 Links
100 Chains
100 Chains
100 Chains

### (D ) LAND TO BE RESUMED FREE OF COMPENSATION.

The belt of 400ft. surrounding the farm would be held by the owner as an ordinary lease until resumed by the Crown. On resuming such land the Crown would make no payment for improvements, or for increase in unimproved value of the land, except in the case of heavy clearing, the value of which could be mutually agreed upon. Hence, a settler erecting buildings, sinking wells, or scooping out dams within 400ft. of his boundaries would do so at his own risk and without any chance of securing compensation. In special cases the Minister might agree to such improvements being made, subject to the complete alienation of the area concerned; no such improvements, however, would be recognised unless the Minister's sanction thereto had previously been secured.

### (E ) FENCING TO BE DONE BY THE STATE.

The mallee farmer's boundary fence is not, as a rule, of much value; at the same time young plantations, if they are to succeed, must receive adequate protection against both large and small stock. Hence, it appears to me that the burden of providing a double line of sheep-proof fencing must fall upon those who plant the trees, *i.e.*, in this case on the State. As already pointed out, in cases of adjoining farms, the cost of the central line of fencing will be avoided.

### (F ) WORK INVOLVED IN ESTABLISHING AND MAINTAINING BELT OLIVE GROVE.

I propose that the planting of these olive groves be carried out either directly by the Department of Agriculture, or under its immediate supervision. The initial work involved would be somewhat as follows:—

1. Complete clearing of the area to be planted, including the removal of all stumps and roots.
2. Trench ploughing the land to a depth of from 15in. to 18in., and working it down subsequently to suitable condition for planting.
3. The establishment of small local or central nurseries in which olive truncheons would be rooted, or seedlings raised.
4. Planting operations, and early care of groves.
5. Regular yearly tillage operations and pruning.

### (G ) THESE OLIVE BELTS MAY OBVIATE THE PERIODIC NECESSITY OF DROUGHT RELIEF.

I suggest that in normal times the State area under olive trees be gradually increased year by year by resuming and planting belts of land suitable for the purpose; and in the course of time these plantations must acquire the importance of a great national undertaking.

I submit further, however, that this systematic building up of olive groves offers incidental advantages of great value in times of stress. If my suggestions are adopted these plantations will be established chiefly in areas of low rainfall; and when the latter come under the periodic influences of drought, settlers in need of relief could in their immediate neighborhood be set the task of clearing and preparing land for planting. Moreover, so long as established groves continue State-owned, adequate provision will have to be made for yearly cultural operations and upkeep, which could be undertaken at contract rates and under departmental supervision by those whose land the plantations encircled. It is clear that in times of stress regular receipts of this kind are likely to render less necessary applications for drought relief. Finally, as is indicated lower down, it will always be open to adjacent land owners to acquire or to lease groves surrounding their properties and which have come into bearing; and when cereals fail, as they occasionally do, the olive crop will often help the settler out of temporary difficulties.

## (H) RETURNED SOLDIERS MIGHT BE EMPLOYED IN ESTABLISHING BELT OLIVE GROVES.

I suggest, too, that the laying out of these groves offers a useful means of relief in times when unemployment is rife; and particularly should this be the case in the years that follow the cessation of hostilities. We must anticipate that in these times many will be in search of employment, whilst suitable avenues can only develop slowly. Many will find it difficult to adapt themselves immediately to former civil avocations; and some transition form of occupation will no doubt prove invaluable. Many, no doubt, notwithstanding their earlier training, will feel attracted to the land and outdoor work; of these we cannot hope that more than a small minority will develop into permanent settlers; a large proportion, it is to be feared, will, after due trial, be repelled by the comparative loneliness and monotony of country life, and gradually drift back to their original callings. I suggest that much of this restless labor might be occupied to the advantage of both themselves and of the State in building up olive groves on belts encircling land, which would ultimately fall to them, or even to others. In this fashion, returned soldiers, to whom land could not be immediately allotted, or for whom congenial occupation could not at the time be found elsewhere, would be given ample opportunities to realise the inwardness of country occupations, and if, as the glamor wore off, many tended to fall out of the ranks, it would be satisfactory to know that their energies had not been misspent in useless work.

Work of this kind would very largely be nomadic in character; no costly buildings or equipment would be needed beyond what is essential to fit up a periodically shifting camp, and to clear and prepare land thoroughly for the reception of olive plants.

### (I) CONDITIONS UNDER WHICH GROVES MIGHT BE WORKED.

Olive groves steadily expanding from year to year in this fashion, will, in the course of time, come to occupy extensive areas of country; and as they gradually come into bearing the question of the best means of utilising them will naturally come up for consideration. In this connection there are various methods of treatment which suggest themselves; those which appear to me less open to objection have been summarised below as follows:—

1. In the first place, failing adequate private means for absorbing the produce of the trees, it will be incumbent on Government to erect State factories and throw them open to all those having olives for sale. This erection of State factories will be equally necessary if local buyers should appear to be taking unreasonable advantage of the absence of competition to reduce prices below profitable level. Further, if the State continued in actual possession of large areas of olive trees in full bearing, the erection of State factories would still be desirable, were it only from the point of view of the handling of the produce of State groves.

2. The State might elect to remain permanent owner of whatever olive groves had been laid out under departmental supervision. Moreover, whether this line of policy were adopted or not, it is quite certain that portion at least of the areas planted must from time to time continue under direct State management; hence the following methods of treatment might, according to circumstances, be suggested for whatever groves the State continued to own:—

(*a*) The groves might be worked wholly by day labor under departmental supervision; and whilst I do not look upon this proposal as ideal, I recognise that in many instances it will be unavoidable.

(*b*) Subject always to departmental supervision, the groves might be worked under contract with adjoining farmers. I much prefer this arrangement; it would help to break down any local aloofness that might exist, to create local interest in olive trees, and to open the way to individual local experience in the special requirements of the trees.

(*c*) The State might agree to lease groves to private individuals, with preference always to adjoining landowners. For the protection of the trees such leases would be subject to stringent supervision clauses. Rentals would be determined on average net returns, and not on interest on cost of production, which, in view of the piecemeal fashion in which groves would have been built up, must vary much according to circumstances. Whilst an outright sale of the groves would be better calculated to forward the aims we have in view, leasing, when opportune, should always be welcomed as helping to encourage local interest in the industry.

(*d*) Subject always to departmental supervision, the State groves might be worked on the "shares" principle, *i.e.*, in way of payment the State would receive a fair proportion of the crop, to be determined upon definitely when greater familiarity with the industry had been established locally.

3. The State might offer to sell the groves to anybody prepared to purchase them, preference always being given to the owner of adjoining land. Prices asked for should again be based on average net returns. If the industry is to thrive in our midst, it is highly desirable that from time to time the State should be able to dispose of by sale olive groves in full bearing. There is nothing likely to stimulate local interest more than the private ownership of the groves. Nor do I think that in such transactions the State need suffer financial loss, either direct or indirect.

### (J) SUMMARY OF PROPOSED TREATMENT OF GROVES.

In brief summary, the general treatment of the State-planted groves will vary according to circumstances. In their earlier years, and before they come into profitable bearing, they will in all probability remain, without exception, the property of the State. Wherever possible, they should, during this period, be worked under contract and departmental supervision by adjoining land owners; although probably it would be better that training and pruning should be carried out by departmental trained hands. In isolated spots, or in those in which mutual agreement on the subject was unobtainable, the whole of the work would have to be carried out entirely by departmental gangs and equipment.

When the groves come into bearing, those that can be sold should be sold as opportunity arises; those continuing the property of the State should be leased, or worked on shares, or, when neither alternative is possible, they should be worked on the lines already suggested for young groves in the unproductive stage.

## VII.—INQUIRY INTO ECONOMIC CONDITION.

And, finally, what are the prospects of favorable net returns from a very largely extended local area under olive trees? In other words, from the financial point of view, does olive-growing admit of any important extension in South Australia? Before attempting to deal with this aspect of the question, let me recall that, altogether independenly of its solution, an important extension of the area under olive trees must carry in its train a number of incidental advantages, among which we may quote—

1. Much country will be saved from becoming a treeless waste.
2. Drift will be definitely checked within planted areas.
3. Adequate shelter will be provided for crops and livestock in open, wind-swept plains.
4. In times of need, useful employment will be available to those out of work.
5. Applications for drought relief should within the planted areas be reduced to a minimum.
6. *Employment on a large scale will be open to returned soldiers so soon as they are disbanded in large numbers.*
7. The olive groves, by providing constant local employment, will tend to add density to our rural population, and perhaps to help towards the development of village centres and settled rural communities.
8. Olive-growing, by providing additional and, it is hoped, profitable employment, will represent a useful step towards closer settlement, and the ultimate reduction in area of individual holdings.

Apart from questions of shelter and the benefits inherent to the planting of any kind of trees—all of which is of immense importance to us, and cannot with safety be overlooked—the indirect advantages indicated above are more or less contingent on the ability of the trees to carry profitable crops of fruit under climatic and economic conditions obtaining here. Climatic conditions are, beyond question, exceptionally favorable, and need not detain us; economic conditions, on the other hand, which usually dominate net returns, are perhaps more open to cavil. A complete study of the economic questions involved would, I am afraid, occupy more space than can be allotted to it in a report of this kind; moreover, absolutely dependable data are almost unobtainable in the present circumstances; nor can I perhaps claim complete competence in such matters. I shall therefore confine myself to the statement of a few facts which appear relevant to the position.

### (A) POSITION OF OLIVE OIL ON THE LOCAL MARKET.

The amount of olive oil locally produced does not nearly cover present Commonwealth requirements, whilst, according to the Commonwealth Statistician, production in the other States is practically negligible. In connection with this aspect of the question, I indicate below, in Table I., what has been the South Australian olive oil production over the past 10 years.

TABLE I.—*Showing Production of Olive Oil in South Australia* (1905-14).

| | Gallons. | | Gallons. |
|---|---|---|---|
| 1905 | 17,762 | 1911 | 7,817 |
| 1906 | 16,164 | 1912 | 3,762 |
| 1907 | 16,954 | 1913 | 26,964 |
| 1908 | 12,998 | 1914 | 1,680 |
| 1909 | 16,464 | | |
| 1910 | 26,340 | Mean | 14,690 |

Thus, then, the mean yearly output of olive oil in South Australia, and consequently in the Commonwealth, was represented over the last 10 years by about 15,000galls.; over the same period Commonwealth importations of olive oil from foreign countries amounted to about 45,000galls. per annum, in the teeth of a protective duty of 2s. 6d. per gallon. It must be clear, therefore, that from the point of view of local consumption alone, in a growing country, with constantly increasing demands, such as the Commonwealth, we can without fear expand our present area under olive trees five or six fold. Unfortunately, there is no available estimate as to the approximate area under olive trees in South Australia; but from the average yields recorded, I should say that we probably have within the neighborhood of 1,000 acres under productive trees. And from the point of view of the home market alone, therefore, and on the basis of present Commonwealth consumption, we have ample room for another 5,000 or 6,000 acres of olive trees.

But are we justified in assuming that the present Commonwealth rate of consumption of olive oil is likely to remain stationary? In old olive-growing countries, such as Italy and Spain, in which the area under olive trees runs into millions of acres, from two-thirds to three-quarters of the local production of oil is locally consumed; and whilst as a race we are probably never likely to rival the Latin races as consumers of olive oil, nevertheless, it seems to me more than probable that with a great increase in production, and a general lowering of local prices, local consumption will increase manifold. Nor should it be forgotten that 60,000 odd gallons of olive oil do not nearly represent our annual consumption of edible oils; many other cheaper types, such as cotton-seed oil, are imported in large quantities. Thus in 1914-15 over 300,000galls. of cotton and colza oils, paying 2s. 6d. import duty, were imported into the Commonwealth. The great superiority of olive oil for general table purposes over any other type of oil is generally admitted; and it is only local scarcity and prevailing high prices which keep it back from the multitude. Hence I feel fairly safe in saying, on the grounds of a probable increased Commonwealth consumption alone, that if within the next 10 years our area under olive trees were to expand into 15,000 to 20,000 acres, there is absolutely no reason to anticipate any local glut of the article.

### (B) THE WORLD'S IMPORTS OF OLIVE OIL.

There is, however, no good reason why we should confine our olive oil output to the limited demands of a local market. The world's requirements of this commodity are very considerable, and its widespread adulteration with cheaper neutral-tasting oils is a sure indication that the demand on the world's markets is in excess of the supply. I have endeavored to summarise the position in Table II., in which have been indicated the importations of olive oil by the principal countries of the world. These figures have reference for the most part to the pre-war decade, *i.e.,* 1904-13.

TABLE II.—*Showing Average Yearly Imports of Olive Oil by Principal Countries of the World* (1904-13).

| | Galls. | | Galls. |
|---|---|---|---|
| France | 4,821,050 | Turkey | 173,937 |
| Argentine | 4,310,081 | Mexico | 125,546 |
| United States of America | 3,760,945 | Sweden | 102,010 |
| United Kingdom | 3,098,114 | Serbia | 101,363 |
| Canada | 2,520,860 | Portugal | 77,324 |
| Russia | 1,676,500 | South African Union | 64,872 |
| Germany | 1,439,134 | Australia | 44,440 |
| Italy | 1,432,830 | Holland | 43,328 |
| Austria-Hungary | 1,246,874 | Ecuador | 31,213 |
| Cuba | 1,139,031 | Japan | 23,847 |
| Roumania | 922,750 | Mauritius | 14,035 |
| Brazil | 792,792 | Denmark | 12,955 |
| Chile | 671,230 | Erythrea | 12,619 |
| Belgium | 634,113 | Tunisia | 11,768 |
| Egypt | 609,235 | Costa Rica | 10,572 |
| Bulgaria | 577,566 | New Zealand | 7,461 |
| Switzerland | 498,755 | Spain | 4,185 |
| Uruguay | 377,695 | | |
| Norway | 293,629 | | |
| Algeria | 184,061 | Total world's imports | 31,848,720 |

Thus, then, in summary the world's average yearly imports of olive oil were represented in the 1904-13 decade by about 32,000,000galls. This total, however, represents only a fraction of the edible oils imported by the world, many of which would undoubtedly be replaced by olive oil were it only available in sufficient quantities.

### (C) THE WORLD'S OLIVE OIL PRODUCTION.

An accurate estimate of the world's total production of olive oil is less readily made than an estimate of imports or exports; many countries unfortunately register their production statistics very imperfectly, whilst for others no figures at all appear to be collected. We should not forget, however, that even in South Australia we are not altogether blameless, since, apparently, we have not yet overcome the difficulty of determining the local acreage under olive trees. In connection therefore with data in Table III., it must be pointed out that the areas under olive trees indicated for France, Algeria, Austria, United States of America, Cyprus, and Greece have been roughly calculated from average figures having reference to the total production of olive oil. And it is indeed highly probable that in all these cases the acreage figures are too low, since olives are utilised very extensively for pickling purposes in most of these countries. The acreage under olives in Italy, on the other hand, although official, is unquestionably excessive, since it has been made to include other crops currently grown in promiscuous mixture with the olive trees. Finally, both the area under trees and the production of olive oil indicated for Turkey are no more than rough estimates of my own, based on the available figures of the exports of olive oil. In most Eastern olive-growing countries about three-quarters of the produce of the trees is consumed locally, and no more than one-quarter exported; in the absence of any figures relating to production I have assumed this to be the case for Turkey.

As much as has been possible, all figures given in Table III. have been based on the 1904-13 decade.

TABLE III.—*Showing for the Chief Olive-Growing Countries of the World Acreage Under Olive Trees and Average Yearly Production of Olive Oil,* 1904-13.

| Country. | Acreage.<br>Acres. | Olive oil.<br>Galls. |
|---|---|---|
| Italy | 4,256,547 | 43,263,090 |
| Spain | 3,481,115 | 48,107,911 |
| Algeria | 1,469,360 | 10,443,300 |
| Greece | 1,000,000 | 12,250,000 |
| Turkey | 1,000,000 | 12,000,000 |
| Tunisia | 900,000 | 6,396,650 |
| Portugal | 813,350 | 5,456,100 |
| France | 380,000 | 2,865,517 |
| Austria | 15,000 | 538,643 |
| United States of America | 7,300 | 259,452 |
| Cyprus | 7,000 | 203,220 |
| Chile | 1,000 | 14,417 |
| South Australia | 1,000 | 14,690 |
| Totals | 13,331,672 | 141,812,990 |

Thus as far as can be ascertained, the area under olive trees in the world extends between thirteen and fourteen million acres, whilst in the last decade the average yearly total production of olive oil was about 142,000,000galls. If we compare this last total with the total imports* of olive oil indicated in Table II., namely, about

32,000,000galls., we shall see that fully three-quarters of the olive oil produced is consumed in the countries in which it is produced.

### (D) World's Exports of Olive Oil.

Finally, in order to complete our review of the position, I append, in Table IV., the recorded exports of olive oil from the chief olive-producing countries of the world in the 1904-13 decade.

Table IV.—*Showing Average Yearly Exports of Olive Oil from Chief Olive-Growing Countries*, 1904-13.

| | Galls. | | Galls. |
|---|---|---|---|
| Italy | 9,999,040 | Algeria | 1,324,440 |
| Spain | 8,303,118 | Portugal | 531,623 |
| Turkey | 3,004,330 | Austria-Hungary | 32,388 |
| Tunisia | 2,458,200 | | |
| Greece | 2,054,590 | | |
| France | 1,519,944 | Total exports | 29,227,673 |

Thus the average yearly quantity of olive oil recorded as having been exported by the chief producing countries in the 1904-13 decade—about 30,000,000galls.—corresponds fairly closely to the average yearly total shown to have been imported over the same period of time into the chief consuming countries—32,000,000galls.

### (E) The Prospects of an Export Trade in Olive Oil from South Australia.

Finally, we have to consider whether, in the event of local supplies overtaking local demands, we shall find ourselves in a position to compete successfully on the world's markets against other exporting nations already in the field. In this connection it is worth recollecting that the general demand for olive oil is such that it will not be so much a question of displacing rival exporters, as a question of our ability to supply good olive oil at the world's average prices and at a profit to ourselves. Locally we have hitherto had the great advantages of a protected market, and of supplies much below actual demands; hence it is natural that local prices should have been high relatively to prices ruling beyond the incidence of our Customs duties. I have been informed that prior to Federation, prices ruled round about 7s. 6d. per gallon; in the 14 years which preceded the war prices rose from 7s. 6d. to 11s.; whilst at the present moment 13s. a gallon is the ruling wholesale rate. I am afraid that on the open markets of the world we cannot anticipate securing anything like these prices; what the latter have been within recent times I have endeavored to determine from the declared values of imports and exports at various centres. These figures have been summarised below in Table V.

TABLE V.—*Showing Average Import and Export Values of Olive Oil in Various Centres Between* 1903-12 *and* 1909-13 *Respectively.*

| Country and Period. | Value of oil imported. per gall. | Value of oil exported. per gall. |
|---|---|---|
| Portugal (1903-12) | — | 4s. 2d. |
| Spain (1903-12) | — | 3s. 4d. |
| Italy (1903-12 | 3s. 7d. | 4s. 11d. |
| Greece 1903-11) | — | 2s. 1d. |
| Bulgaria (1903-11) | 3s. 3d. | — |
| Serbia (1903-12) | 2s. 5d. | — |
| Roumania (1902-11) | 3s. 4d. | — |
| Brazil (1902-11) | 6s. 8d. | — |
| Uruguay (1902-11) | 5s. 3d. | — |
| Argentine (1903-12) | 3s. 3d. | — |
| United Kingdom (1909-13) | 5s. 2d. | — |
| United States of America (1909-13) | 6s. 6d. | — |

We may note from this table that there are great variations in the prices quoted at the various centres. We must not infer from this, however, that these differences are exclusively the result of remoteness from or closeness to centres of supply or consumption. Much in this connection must be allowed for varying quality in the oil sold; a commercial character very largely dependent on manufacturing processes which are notoriously lax in the East. So far as we are concerned we have no reason to fear any lack of quality in the oils which we may place on the market; climate and soil are in our favor, and skill and care in manufacturing processes are not beyond our reach. In this connection it may be pointed out that on the local market we have been able to maintain prices well above those secured for imported oil, even after due allowance has been made for the 2s. 6d. duty. I find that the average c.i.f. values of olive oil imported by the Commonwealth have within recent years been as follows:—1912, 5s. 9d. per gallon; 1913, 6s. 6d.; 1914, 6s. 3d.; 1912-14, 6s. 2d.

Between 1912 and 1914, therefore, after adding 2s. 6d. for duty, olive oil has been imported into the Commonwealth at an average price of 8s. 8d. per gallon. Over the same period, however, the average price of the local article has been considerably above this figure. I mention these facts in support of the contention that whatever they may happen to be, we may always depend upon commanding on the markets of the world top prices for our olive oil.

The prospects of our export trade therefore appear to depend on whether we can, at a profit to ourselves, place in Great Britain or in North America, first-class olive oil at 5s. to 6s. per gallon. Our ability to do this revolves around the average local cost of production; a question which it is never easy to determine satisfactorily; chiefly because in actual practice so much depends on the personal factor. I am compelled, however, to attempt to make some such estimate from local figures that have been very kindly supplied to me.

Pruning, I am informed, need not exceed an average of more than 15s. per acre per annum (allowing for a heavy pruning every third year, followed by two light prunings). Tillage is not likely to exceed that figure, and in the way of working expenses there remains only the cost of picking the fruit to be taken into consideration; and this, unfortunately, is said to vary between £4 and £5 10s. a ton. I am informed by the Stonyfell Olive Company that for their own groves they consider 2.2 tons a fair average yield of olives. I am rather doubtful as to whether this figure can be used with safety in the way of a general average for the State. It approximates, it is true, the average French yield, but on the other hand, it is much in excess of that of Spain and of other southern countries in which average yields do not exceed 10cwts. to the acre.

If, however, we were to assume the average yield per acre to be two tons per annum, the yearly working expenses would be approximately £11 per acre; to this sum would have to be added the rental value of the land, and the yearly contributions towards a sinking fund, representing the cost of establishing the groves and maintaining them during their early unproductive years. It is not easy to determine satisfactorily a general figure of this kind; probably, however, £1 an acre would cover most cases. Hence, for a two-ton crop, general expenses per acre would be represented by £12. The berries, I am informed, are purchased at the rate of £11 a ton delivered; hence, the net profits per acre are likely to vary from £9 to £10, according to the distance from centres.

. If, on the other hand, the average yield per acre is only one ton, net profits would vary from £4 to £4 10s. per acre.

We have finally to consider the position of the olive oil maker who purchases his berries. If for the latter he pays £11 per ton, and tracts therefrom about 35½galls. of oil, which I am informed is in accordance with local practice, then, independently of manufacturing expenses, the cost of his raw material alone represents about 6s. 3d. in the value of the oil extracted. This is, I am afraid, a crippling outlay should one have to face selling prices on distant markets of 5s. to 6s. per gallon. The position, however, is not altogether impossible from the point of view of the oil maker who grows his own fruit.

Picking, it will be noted, is the chief economic stumbling block, representing, as it does, nearly half the commercial value of the fruit, and about three-quarters of the yearly working expenses in a one-ton crop, or seventeen-twentieths of the working expenses in a two-ton crop. Very probably, however, if olive-growing were ever to be adopted here on a large scale, some labor-saving method of collecting the fruit would be devised.

## VIII.—CONCLUSION.

In conclusion, I respectfully submit that from the point of view of Commonwealth consumption alone, we can with perfect safety extend our olive groves to an area of fifteen to twenty thousand acres. From the point of view of the export market, however, if we could safely venture thereon, the prospects of extension are almost unlimited. And whilst I admit that the issue in this direction is clearly debatable, I believe, nevertheless, that we shall be in a position ultimately to overcome such difficulties as may arise.

I respectfully submit, too, that from the general point of view the industry is well worth encouraging on the lines indicated in this report. And in this work, when the time comes, returned soldiers whom it may otherwise be difficult to employ, could be profitably employed in building up new groves for the State in the way suggested in this report.

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# THE COMING HARVEST.

## OFFICIAL ESTIMATE, 33,368,702 BUSHELS.

The official estimate of the quantity of wheat that will be harvested in South Australia has been compiled by the Government Statist (Mr. W. L. Johnston), who computes that the yield for the season 1916-17 will be 33,368,702bush. Whilst this falls short of last year's production by 765,802bush., it is nevertheless appreciably higher than the yield of any previous year.

The Central division, it is anticipated, will fall short of last year's production to the extent of 280,913bush., the Lower North 1,191,382bush., and the South-East 558,664bush., but the Upper Northern division is expected to yield 577,992bush. more than was gathered there last year, and the Western area promises to show a surplus over last year's figures to the extent of 687,165bush. The average per acre for the area sown in the State, 12.41bush., closely approximates that of 1915-16, viz., 12.46.

In each of the divisions, the total weight of hay cut promises a decrease on the figures of 1915-16, this decrease amounting to, for the whole State, 277,959 tons.

### The Area Sown.

The December estimate of the area sown to wheat gives this figure at 3,086,169 acres. Of this area, it is anticipated that 2,689,159 acres will be reaped for grain, 368,642 acres cut for hay, and 28,368 acres, including areas self-sown, fed off.

Comparison with last year's statistics reveals a falling off in the area reaped to the extent of 50,055 acres, and the area cut for hay 107,781 acres.

Tabulated, the figures of the harvest estimate are as follows:—

### STATE OF SOUTH AUSTRALIA.

December Estimate of Production Wheat Harvest, Season 1916-17.
Grain, 33,368,702bush.; average, 12·41bush. Hay, 476,557 tons; average 1·29 tons.

| County. | Grain. | | Average per Acre. | | Hay. | |
|---|---|---|---|---|---|---|
| | Actual, 1915-16. | Estimated, 1916-17. | Actual, 1915-16. | Estmtd., 1916-17. | Actual, 1915-16. | Estmtd., 1916-17. |
| | Bush. | Bush. | Bush. | Bush. | Tons. | Tons. |
| **CENTRAL—** | | | | | | |
| Albert | 1,025,613 | 1,063,743 | 8·73 | 8·76 | 12,237 | 12,394 |
| Alfred | 1,085,864 | 1,273,979 | 11·19 | 10·97 | 14,323 | 15,330 |
| Eyre | 839,634 | 877,919 | 10·90 | 11·29 | 24,325 | 15,087 |
| Fergusson | 2,218,760 | 2,024,169 | 13·85 | 13·29 | 22,718 | 16,015 |
| Gawler | 2,067,550 | 1,999,448 | 15·12 | 14·57 | 89,224 | 45,973 |
| Light | 1,706,987 | 1,371,078 | 16·52 | 13·48 | 96,646 | 51,841 |
| Sturt | 814,598 | 830,474 | 11·06 | 10·92 | 18,911 | 15,514 |
| Other counties | 461,045 | 498,328 | 13·57 | 13·30 | 112,675 | 58,131 |
| Total | 10,220,051 | 9,939,138 | 12·78 | 12·12 | 391,059 | 230,285 |
| Increase | — | −280,913 | — | −·66 | — | −160,774 |
| **LOWER NORTH—** | | | | | | |
| Burra | 656,549 | 524,558 | 18·98 | 16·28 | 10,733 | 6,566 |
| Daly | 3,751,800 | 3,614,183 | 13·51 | 13·45 | 61,963 | 35,024 |
| Stanley | 4,505,720 | 3,912,311 | 16·83 | 16·09 | 77,593 | 42,184 |
| Victoria | 3,595,833 | 3,195,120 | 16·89 | 16·08 | 90,622 | 49,985 |
| Other counties | 187,777 | 260,125 | 7·72 | 10·83 | 3,313 | 3,784 |
| Total | 12,697,679 | 11,506,297 | 15·54 | 15·01 | 244,224 | 137,543 |
| Increase | — | −1,191,382 | — | −·53 | — | −106,681 |
| **UPPER NORTH—** | | | | | | |
| Dalhousie | 1,216,458 | 1,225,853 | 12·47 | 13·17 | 21,756 | 16,296 |
| Frome | 1,918,553 | 1,982,506 | 13·71 | 13·76 | 32,712 | 26,159 |
| Newcastle | 127,889 | 291,065 | 6·32 | 12·59 | 2,194 | 5,963 |
| Other counties | 117,892 | 459,360 | 3·19 | 10·67 | 1,209 | 6,207 |
| Total | 3,380,792 | 3,958,784 | 11·47 | 13·05 | 57,871 | 54,625 |
| Increase | — | 577,992 | — | 1·58 | — | −3,246 |
| **SOUTH-EASTERN—** | | | | | | |
| Buccleuch | 787,383 | 760,725 | 8·98 | 8·24 | 4,652 | 4,555 |
| Buckingham | 791,066 | 471,526 | 15·46 | 11·77 | 3,254 | 2,187 |
| Chandos | 1,713,055 | 1,542,873 | 12·05 | 11·88 | 10,422 | 6,676 |
| Russell | 237,659 | 321,267 | 8·61 | 9·92 | 2,858 | 3,202 |
| Other counties | 521,730 | 395,838 | 12·27 | 11·71 | 7,188 | 7,016 |
| Total | 4,050,893 | 3,492,229 | 11·54 | 10·63 | 28,374 | 23,636 |
| Increase | — | −558,664 | — | −·91 | — | −4,738 |
| **WESTERN, ETC.—** | | | | | | |
| Dufferin | 163,558 | 225,237 | 8·89 | 10·49 | 1,317 | 1,108 |
| Flinders | 749,763 | 482,361 | 10·24 | 8·93 | 5,070 | 3,636 |
| Jervois | 1,183,572 | 1,209,806 | 8·70 | 8·94 | 12,984 | 9,476 |
| Kintore | 140,742 | 248,430 | 5·84 | 8·92 | 777 | 1,457 |
| Musgrave | 326,238 | 228,018 | 10·94 | 8·18 | 3,384 | 1,540 |
| Robinson | 576,911 | 636,976 | 8·17 | 9·03 | 4,468 | 3,651 |
| Way | 435,226 | 1,056,789 | 4·48 | 10·70 | 2,186 | 5,727 |
| Other counties, &c. | 209,084 | 384,687 | 7·66 | 11·07 | 2,852 | 3,873 |
| Total | 3,785,089 | 4,472,254 | 7·94 | 9·50 | 32,988 | 30,468 |
| Increase | — | 687,165 | — | 1·56 | — | −2,520 |
| Grand total | 34,134,504 | 33,368,702 | 12·46 | 12·41 | 754,516 | 476,557 |
| Increase | — | −765,802 | — | −·05 | — | −277,959 |

# ROSEWORTHY AGRICULTURAL COLLEGE.

## SIXTH REPORT ON THE PERMANENT FIELD EXPERIMENTS, SEASONS 1904-1915.

[By WALTER J. COLEBATCH, B.Sc., M.R.C.V.S., Principal, Roseworthy Agricultural College, and R. C. SCOTT, Assistant Experimentalist.]

*(Continued from page 359.)*

### (C)—ROTATIONAL EXPERIMENTS.

From the scheme of rotational experiments included in the introductory remarks to this report, it will be seen that we have seven different rotations under observation, namely, two 2-course, two 3-course, one 4-course, and two 5-course systems. Of these the 4-course and one of the 5-course series have not been established long enough to admit of a complete cycle of operations on any one plot, and hence we are not in a position to comment upon them. In the bare fallow-wheat-barley rotation and also in the other 5-course experiment the first cycle has been concluded, and in the remainder of the series we are in an even better position in this regard.

In the past, other forms of cropping rotation have been tried, but, for reasons given in prior reports, they have been found wanting, and discontinued. Those that are now under study comprise the systems that, in the light of general farming experience gained in the district and also of experimental knowledge acquired at first hand, appear to be the most likely to prove of importance under local conditions. In view of the upward trend of livestock values, any suggestion that will lead to an increase in the stocking capacity of our farms is deserving of thoughtful consideration, and it is only by submitting various schemes of cropping to the practical test that we can hope to place ourselves in a position to judge of their relative economic values. Rotational experiments must obviously be protracted over a long succession of seasons before deductions from the data supplied can be expected to carry full weight, as the effects of one crop upon another will only be exerted once during each cycle of operations, and hence a series of cycles are required to bring out results that may be regarded as indicative of the economic worth of any rotation established on a permanent basis.

## 1.—TWO-COURSE ROTATIONS.

### (*a*) BARE FALLOW-WHEAT.

This simple system exemplifies the usual method of farming adopted in the wheatgrowing areas of the State. The College tests have been in progress continuously on the same pair of plots since 1905; so that we now have the results of more than five cycles available.

In the table below are given the detailed results for this period, together with the means:—

TABLE XL.—*Showing Harvest Returns from Wheat Grown Continuously after Bare Fallow, with* 1*cwt. Superphosphate to the Acre* (*Plots* 10 *and* 11), 1905-15.

| Year. | Total Produce per Acre. T. | C. | L. | Grain per Acre. Bush. | lbs. | Straw to 60lbs. of Grain. lbs. | Bushel Weight. lbs. |
|---|---|---|---|---|---|---|---|
| 1905 | 2 | 11 | 54 | 28 | 56 | 139 | 62½ |
| 1906 | 2 | 8 | 100 | 23 | 43 | 171 | 58½ |
| 1907 | 1 | 8 | 88 | 20 | 31 | 97 | 62½ |
| 1908 | 2 | 11 | 26 | 32 | 46 | 115 | 64½ |
| 1909 | 2 | 7 | 61 | 29 | 54 | 118 | 62½ |
| 1910 | 2 | 5 | 98 | 19 | 49 | 199 | 64¼ |
| 1911 | 1 | 8 | 9 | 14 | 7 | 163 | 63¼ |
| 1912 | 1 | 6 | 32 | 18 | 11 | 102 | 65¾ |
| 1913 | 0 | 10 | 19 | 5 | 4 | 165 | 60 |
| 1914 | 0 | 8 | 106 | 6 | 9 | 163 | 64½ |
| 1915 | 2 | 9 | 9 | 23 | 32 | 234 | 60½ |
| Means | 1 | 16 | 4 | 20 | 15 | 151 | 62½ |
| Mean—Hay equivalent | 2 | 3 | 106 | | | | |

We see that under this rotation the mean wheat yield is 20bush. 15lbs., and the corresponding hay yield 2 tons 3cwts. 106lbs. per acre under crop. At normal values, these yields represent gross cash returns of £3 10s. 10d. and £3 16s. 11d., and since they have been obtained with the use of but 1cwt. of superphosphate per acre, a deduction of 4s. 6d. only per acre will give the net values. In order to arrive at what may be termed the true net profits from these mean yields, we shall require to allow for rent, tillage, harvesting and marketing of the produce. It is customary to reckon the rental value of wheatgrowing land in this district at 10s. per acre, and for the purposes of this report, we have estimated the cost of growing and disposing of the crop at 30s. per acre. On these values, the net profit per acre will be the gross cash returns less the rental value of two acres and cost of production. This works out at a net profit of £1 0s. 10d. per acre under crop, or 10s. 5d. per acre over the whole area when the crop is harvested for grain, and £1 6s. 11d. per acre of crop, or 13s. 5d. per acre over all when it is cut for hay. It is evident, therefore, that in this district hay-growing is a better paying venture than grain production, and that to the extent of approximately 6s. per acre under crop. In submitting these monetary computations, however, we recognise that the values chosen are pure estimates, and will be subject to modification, according to circumstances and personal experience. They are, however, approximately true for this district, and we regard them as sufficiently accurate to enable reliable comparisons to be made. In addition to the profit derived from the crop, we have to credit this rotation with the cash value of the sheep-grazing obtained on the fallow, on the stubble, and that provided between March and ploughing time. The fallow grazing cannot be fairly gauged on small-sized plots, but past experience on the farm areas has led to this being appraised at 0.25 sheep per acre per annum in average seasons. The stubble and autumn grazing returns are given below:—

Table XLI.—*Showing the Grazing Capacity of Land Treated Alternately as Wheat and Bare Fallow* (*Plots* 10 *and* 11), 1907-15.

| | Stubble Grazing. | | | Winter Grazing before Fallowing. | | |
|---|---|---|---|---|---|---|
| Year. | Equivalent Sheep per Acre per Annum. | Gross Returns at 15s. per Sheep per Annum. | | Equivalent Sheep per Acre per Annum. | Gross Returns at 15s. per Sheep per Annum. | |
| | | *s.* | *d.* | | *s.* | *d.* |
| 1907 | — | — | | 0·93 | 13 | 11½ |
| 1908 | — | — | | 0·46 | 6 | 11 |
| 1909 | 0·42 | 6 | 4 | 0·15 | 2 | 3 |
| 1910 | 0·25 | 3 | 9 | 0·54 | 8 | 1 |
| 1911 | 0·36 | 5 | 5 | 0·49 | 7 | 4 |
| 1912 | 0·67 | 10 | 1 | 0·00 | — | |
| 1913 | 0·21 | 3 | 2 | 0·00 | — | |
| 1914 | 0·34 | 5 | 1 | 0·12 | 1 | 10 |
| 1915 | 0·78 | 11 | 8 | 0·54 | 8 | 1 |
| Means | 0·43 | 6 | 6 | 0·36 | 5 | 5 |

The total value of the grazing is thus seen to be 6s. 6d. plus 5s. 5d plus 3s. 9d., or 15s. 8d. per annum, which is equivalent to 7s. 10d. per acre per annum over the whole area.

Combining the crop and grazing returns, the total net profit per acre per annum over the whole area under this rotation comes to be 18s. 3d. when grain is harvested, and 21s. 3d. when hay-growing is practised. It is doubtful if the same net profits could be obtained from large areas as are quoted above, for it would not be possible to turn to account the sheep fed over broad acres as thoroughly as is done in the case of small plots on which sheep are drafted in the required numbers and at the most suitable times from the farm flock. Moreover, it is not reasonable to expect that averages gained over small blocks could be attained on fields fifty or a hundred times as large. Indeed, on our own farm the mean yields fall somewhat below those recorded in the foregoing tables. Nevertheless, the results quoted have actually been obtained, and hence may be regarded as a proper measure of the producing value of the rotation when conducted under ideal conditions. Since all the other plots with which we shall have to compare these returns have received equivalent treatment and are of approximately the same area, no valid objection can be taken to inferences drawn from the data supplied by them.

### (*b*) SORGHUM-WHEAT.

It has been the practice at Roseworthy College for many years to grow, or, perhaps it would be more correct to say, attempt to grow, crops of sorghum without irrigation, and in the history of the institution many excellent fields of summer forage have been raised. After a few seasons, however, it became evident that sorghum was not to be classed as a reliable crop, and latterly we have come to regard it as too risky to be hazarded in large areas. Notwithstanding this, however, we continue to sow a few acres each spring, with a view to providing additional grazing for sheep and dairy cattle through the late summer months. There can be no gainsaying the fact that a crop of well-grown sorghum is invaluable on a mixed farm in this district from December to March. Owing to the toxic character of its foliage under dry conditions, when growth has been arrested and crude products such as hydrocyanic acid have accumulated in the sap, serious consequences have resulted from allowing stock—particularly dairy cows—to consume it in the field or immediately after being cut. Errors of this kind, however, are easily overcome by proper management, and it is a fine tribute to the value of the crop in the eyes of farmers that it continues to be grown as a stock food in spite of the criticism that has been levelled at it by those who have had the misfortune to suffer loss through using it.

Whatever may be the opinions held by others, we have no hesitation in saying that, when properly managed, sorghum may be fed with absolute safety to all classes of farm stock, and if we were located in a moister climate much larger blocks would be sown in the College fields.

As it is, however, we have to consider the effects of a summer forage crop of this nature on the main crops grown and through them on the system of farming generally practised. We shall see in a moment that there is a good deal to be said against as well as in favor of the substitution of a sorghum crop for bare fallow, but there are other factors to be considered in the case, that cannot be expressed in terms of figures. However, before going into this aspect of the question, let us examine the results obtained from the test plots.

TABLE XLII.—*Showing the Yields of Wheat after Sorghum, Comparatively with Yields of Wheat after Bare Fallow*, 1906-15.

| Year. | Total Produce per Acre. | | | | | | Grain per Acre. | | | | Bushel Weight. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wheat after Sorghum. | | | Wheat after Bare Fallow. | | | Wheat after Sorghum. | | Wheat after Bare Fallow. | | Wheat after Sorghum. | Wheat after Bare Fallow. |
| | T. | C. | L. | T. | C. | L. | Bush. | lbs. | Bush. | lbs. | lbs. | lbs. |
| 1906 ............ | 2 | 0 | 39 | 2 | 8 | 100 | 18 | 3 | 23 | 43 | 57 | 58½ |
| 1907 ............ | 0 | 17 | 22 | 1 | 8 | 88 | 13 | 7 | 20 | 31 | 61¾ | 62½ |
| 1908 ............ | 2 | 9 | 96 | 2 | 11 | 26 | 28 | 16 | 32 | 46 | 63¾ | 64½ |
| 1909 ............ | 2 | 1 | 49 | 2 | 7 | 61 | 20 | 44 | 29 | 54 | 62¼ | 62½ |
| 1910 ............ | 2 | 0 | 44 | 2 | 5 | 98 | 18 | 25 | 19 | 49 | 63¼ | 64¼ |
| 1911 ............ | 1 | 3 | 8 | 1 | 8 | 9 | 12 | 38 | 14 | 7 | 64¼ | 63¼ |
| 1912 ............ | 1 | 10 | 33 | 1 | 6 | 32 | 20 | 18 | 18 | 11 | 64 | 65¾ |
| 1913 ............ | 0 | 8 | 39 | 0 | 10 | 19 | 3 | 19 | 5 | 4 | 61½ | 60 |
| 1914 ............ | 0 | 0 | 0 | 0 | 8 | 106 | 0 | 0 | 6 | 9 | — | 64½ |
| 1915 ............ | 2 | 0 | 93 | 2 | 9 | 9 | 20 | 35 | 23 | 32 | 63 | 60½ |
| Means .......... | 1 | 9 | 20 | 1 | 14 | 55 | 15 | 32 | 19 | 23 | 62¼ | 62½ |
| Mean—<br>Hay equivalent | 1 | 15 | 68 | 2 | 2 | 7 | | | | | | |

These yields clearly teach us the lesson that any withdrawal of moisture from fallows per medium of forage crops will reveal its effects in the following season on the cereal crop. The mean figures for 10 years show a reduction in the grain yield of 4bush. all but 9lbs., and in the hay yield of nearly 6½cwts. per acre, as a consequence of growing a summer forage crop. The grazing on the stubbles and just previous to fallowing is practically equivalent to that obtained under the bare fallow-wheat rotation, but the forage crop raises the total grazing figures by approximately 33 per cent. Details of the grazing are tabulated below:—

TABLE XLIII.—*Showing Annual and Mean Grazing Returns from Sorghum—Wheat Rotation*, 1908-15.

| Year. | Stubble Grazing—Sheep per Acre. | Autumn Grazing—Sheep per Acre. | Sorghum Grazing—Sheep per Acre. | Mean Total Grazing—Sheep per Acre |
|---|---|---|---|---|
| 1908 ........................ | 0·33 | 0·07 | 0·75 | — |
| 1909 ........................ | 0·29 | 0·43 | 1·12 | — |
| 1910 ........................ | 0·36 | 0·53 | 0·94 | — |
| 1911 ........................ | 0·67 | 0·00 | 0·00 | — |
| 1912 ........................ | 0·72 | 0·00 | 0·73 | — |
| 1913 ........................ | 0·50 | 0·00 | 0·51 | — |
| 1914 ........................ | 0·34 | 0·69 | 0·00 | — |
| 1915 ........................ | 0·89 | 0·28 | 0·64 | — |
| Means........................ | 0·51 | 0·23 | 0·59 | 1·35 |

It will be noticed that in 1911 and 1914, the sorghum crop failed entirely, whereas in 1909 it provided feed equivalent to a capacity 1.12 sheep per acre per annum. The value of the mean grazing over the whole area will be seen to work out at 1.35 sheep per acre per annum, which, on our estimate of the average value of a sheep, works out at £1 0s. 3d.

We will next proceed to compare this rotation with the ordinary bare fallow-wheat system of cropping.

Table XLIV.—*Comparing Gross and Net Returns from Wheat and Wheaten Hay Crops Grown under Bare Fallow—Wheat and Sorghum—Wheat Rotations*, 1908-15.

| | BARE FALLOW—WHEAT. | | | | | | SORGHUM—WHEAT | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Grain. | | | Hay. | | | Grain. | | | Hay. | | |
| ***Receipts—*** | £ | *s.* | *d.* | £ | *s.* | *d.* | £ | *s.* | *d.* | £ | *s.* | *d.* |
| Crop | 3 | 5 | 5 | 3 | 11 | 3 | 2 | 14 | 4 | 3 | 2 | 6 |
| Grazing | 0 | 15 | 8 | 0 | 15 | 8 | 1 | 0 | 3 | 1 | 0 | 3 |
| Total receipts per acre for two years | 4 | 1 | 1 | 4 | 6 | 11 | 3 | 14 | 7 | 4 | 2 | 9 |
| Total receipts per acre per annum | 2 | 0 | 6½ | 2 | 3 | 5½ | 1 | 17 | 3½ | 2 | 1 | 4½ |
| ***Expenditure—*** | | | | | | | | | | | | |
| Rent at 10s. per acre | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| Cost of production | 1 | 10 | 0 | 1 | 10 | 0 | 1 | 18 | 0 | 1 | 18 | 0 |
| Total expenditure per acre for two years | 2 | 10 | 0 | 2 | 10 | 0 | 2 | 18 | 0 | 2 | 18 | 0 |
| Total expenditure per acre per annum. | 1 | 5 | 0 | 1 | 5 | 0 | 1 | 9 | 0 | 1 | 9 | 0 |
| Balance of receipts over expenditure per acre per annum | 0 | 15 | 6½ | 0 | 18 | 5½ | 0 | 8 | 3½ | 0 | 12 | 4½ |

It requires to be explained that the above calculations have been made on the mean results secured over an eight-year period. With reference to the cost of production, it may be added that an additional 8s. per acre has been allowed for in the summer crop rotation, to meet the cost of ½cwt. of bonedust and 7lbs. of seed. Both in hay and grain cropping, the bare fallow shows to better advantage than the forage crop, the difference being in the vicinity of 6s. or 7s. per acre, and, therefore, it would appear that in order to grow sorghum in this district we must be prepared to sacrifice about 8cwts. of hay or 4bush. of grain for every acre grown in alternation with wheat. On the face of it, one would say that the cost was too great, and that consequently sorghum must in future be treated as an irrigation crop only; but it would be unwise to jump to conclusions too quickly in this matter, for there are other aspects of the question to be taken into consideration. For instance, in bad years, when the paddocks run out early in October, and there are no prospects of obtaining sheep-keep between then and the following April, excepting the dry feed on the cereal stubbles, the value of a block of green forage such as sorghum is vastly greater than 7s. 6d. per sheep for six months, which is all we have credited it with in the above calculations. To put it in another way, the worth of succulent grazing during the dry months is in reality much higher than it is in the growing period of the year, and strictly speaking, should be conceded a higher grazing value than the 15s. per sheep, which we have taken as the basis of our computations. In extreme cases a crop of sorghum may be the means of enabling a farmer to carry through his stock instead of having to disperse them at a sacrifice and repurchase in a rising market. We are willing to admit that if grown in large areas in a sorghum-wheat rotation in preference to the bare fallow-wheat system, the receipts of the farm would be appreciably reduced thereby, but we still incline to the view that this fact does not prejudice the opinion that it is wise and commendable for farmers under our climate to reserve limited areas for sorghum each year, and if by so doing they can provide grazing equivalent to what has been obtained at the College from time to time, they will appreciate the tenacity with which we cling to sorghum, as being the most satisfactory of all summer forage crops in this district, under a dry-farming system.

## 2.—THREE-COURSE ROTATIONS.

### (*a*) BARE FALLOW-WHEAT-PASTURE (RAPE).

In its simplest form—bare fallow-wheat-grass—this forms the most widely spread three-course rotation in the State. It is a natural corollary to the bare fallow-wheat system, and in many districts is stoutly championed as being superior in every way to the ordinary two-course system. In the first instance a year of grass was interpolated to give the land a rest, but more recently the profit-earning claims of sheep have induced farmers to substitute a forage crop for the natural grass, and thus to give the land an opportunity of furnishing a growth of fattening fodder for lambs during the resting period.

When the College plots under this rotation were first started in Field No. 4 the resting plot was allowed to lie untouched, but latterly rape crops have been grown instead.

The plot sown to wheat has invariably received 1cwt. of superphosphate per acre, so that this series is strictly comparable with the bare fallow-wheat rotation.

The cropping results from 1908/1915 are contained in the following table:—

TABLE XLV.—*Showing Harvest Returns from Land coming under Wheat Once in Three Years and Dressed Regularly with* 1*cwt. of Superphosphate*, 1908-15.

| Year. | Total Produce per Acre. T. | C. | L. | Grain per Acre. Bush. | lbs. | Straw to 60lbs. of Grain. Lbs. | Bushel Weight. Lbs. |
|---|---|---|---|---|---|---|---|
| 1908 | 2 | 11 | 55 | 29 | 1 | 139 | 63¾ |
| 1909 | 2 | 10 | 56 | 26 | 37 | 152 | 62¼ |
| 1910 | 2 | 10 | 71 | 19 | 2 | 238 | 63½ |
| 1911 | 1 | 17 | 69 | 17 | 51 | 176 | 61¾ |
| 1912 | 1 | 11 | 93 | 20 | 54 | 111 | 65 |
| 1913 | 0 | 11 | 48 | 6 | 8 | 149 | 60½ |
| 1914 | 0 | 11 | 37 | 8 | 20 | 152 | 65 |
| 1915 | 2 | 3 | 18 | 23 | 3 | 210 | 62¾ |
| Means | 1 | 16 | 0 | 18 | 52 | 166 | 63 |
| Mean—Hay equivalent | 2 | 3 | 101 | — | | — | — |

At first glance it would appear that wheat crops raised on the bare fallow-wheat system yield higher returns of grain than those on the three-course, but this is not really so, for if we compare the two mean figures for the same period, namely, 1908/1915, we shall find that there is a difference of only 11lbs. per acre, and that is in favor of the longer rotation. In hay yield, if we disregard the figures for 1905-1907 inclusive, the three-course system is seen to produce on the average 3cwts. 19lbs. more, and at 35s. per ton, this is worth 5s. 7d. per acre. The total values of the mean yields calculated at the usual rates, work out at £3 6s. and £3 16s. 10d. per acre, under grain and hay respectively, so that here again we are confronted with convincing evidence that at Roseworthy hay crops are better worth the growing than grain crops.

In a three-course rotation, which includes a forage crop, the revenue from grazing is a very important consideration, particularly in good grass seasons like 1915. The succeeding table will illustrate the fact that the grazing returns vary within very wide limits according to the seasons—

TABLE XLVI.—*Showing Grazing Value of Land Available for Stocking in Bare Fallow—Wheat—Pasture Rotation*, 1908-15.

| Year | Stubble Grazing—Sheep per Acre. | Autumn Grazing—Sheep per Acre. | Forage Crop Grazing—Sheep per Acre. | Fallow Grazing—Sheep per Acre. |
|---|---|---|---|---|
| 1908 | 0·84 | 0·19 | 2·54 | — |
| 1909 | 0·21 | 0·51 | 1·99 | — |
| 1910 | 0·14 | 1·02 | 1·20 | — |
| 1911 | 0·66 | 0·57 | 1·11 | — |
| 1912 | 0·76 | 0·00 | 1·68 | — |
| 1913 | 0·23 | 0·00 | 0·60 | — |
| 1914 | 0·38 | 0·25 | 0·53 | — |
| 1915 | 2·29 | 0·90 | 4·64 | — |
| Means | 0·69 | 0·45 | 1·79 | 0·25 |
| Values at 15s. per sheep per annum | 10s. 4d. | 6s. 9d. | 26s. 10d. | 3s. 9d. |

It will be recalled that the value of the grazing per acre per annum, under the bare fallow-wheat system was 7s. 10d., whilst it is now seen that the introduction of a forage crop year has raised the income from grazing up to 16s. 4d., or more than the equivalent in value to a sheep per acre over the whole area.

The total value of the grazing per annum per acre of land grazed amounts to no less than £2 7s. 8d., and towards this amount the forage crop has contributed 26s. 10d., the stubble grazing 10s. 4d., autumn grazing 6s. 9d., and the fallows 3s. 9d.

Being now in possession of the required particulars, we are able to draw up a statement of receipts and expenditure for the bare fallow-wheat and bare fallow-wheat-pasture rotations, and to compare the annual returns in terms of money values.

TABLE XLVII.—*Comparing Gross and Net Returns from Wheat and Wheaten Hay Crops Grown under the Bare Fallow—Wheat and Bare Fallow—Wheat Pasture Rotations,* 1908/15.

| | TWO-COURSE ROTATION. | | THREE-COURSE ROTATION. | |
|---|---|---|---|---|
| | Crop Cut for Grain. | Crop Cut for Hay. | Crop Cut for Grain. | Crop Cut for Hay. |
| *Receipts*— | £ *s.* *d.* | £ *s.* *d.* | £ *s.* *d.* | £ *s.* *d.* |
| Crop | 3 5 5 | 3 11 3 | 3 6 0 | 3 16 10 |
| Grazing | 0 15 8 | 0 15 8 | 2 7 8 | 2 7 8 |
| Total receipts per acre for two years | 4 1 1 | 4 6 11 | 5 13 8 | 6 4 6 |
| Total receipts per acre per annum | 2 0 6 | 2 3 5 | 1 17 11 | 2 1 6 |
| *Expenditure*— | | | | |
| Rent at 10s. per acre | 1 0 0 | 1 0 0 | 1 10 0 | 1 10 0 |
| Cost of production | 1 10 0 | 1 10 0 | 1 15 0 | 1 15 0 |
| Total expenditure per acre for two years | 2 10 0 | 2 10 0 | 3 5 0 | 3 5 0 |
| Total expenditure per acre per annum | 1 5 0 | 1 5 0 | 1 12 6 | 1 12 6 |
| Balance of receipts over expenditure per acre per annum | 15s. 6d. | 18s. 5d. | 16s. 3d. | 19s. 10d. |

Some explanatory notes may be necessary to a clear understanding of these figures. In calculating the revenue from crop and grazing, the mean results of the eight years ending 1915 have been used. In order to arrive at the total receipts or expenditure per annum, the total receipts or expenditure per cycle of operations must be divided by the number of years represented in the rotation, that is, by two in the one case, and by three in the other.

With regard to the cost of production, an additional 5s. per acre has been charged against the three-course rotation to defray cost of rape seed and seeding.

The final figures of this table go to show that no matter whether the crop be cut for hay or left for grain, the three-course rotation is a more profitable system of farming than the alternation of bare fallow and wheat. In the case of wheat crops cut for grain, the difference is 9d. per acre per annum, and when cut for hay slightly under 1s. 5d.

These experiments, therefore, appear to have demonstrated quite clearly that the interpolation of a forage crop in the ubiquitous two-course rotation does not spell disaster, but on the contrary, is attended with enhanced monetary returns.

### (*b*) BARE FALLOW-WHEAT-BARLEY.

The astonishing success which attended the introduction of barley into the farm cropping at the College stimulated interest in the possibilities of this crop as a means of diversifying the system of farming without detriment to the wheat crop. It is accepted as an axiom that wheat cannot be grown continuously on the same land year after year successfully, and even if it were not generally acknowledged, we have had ample experimental evidence of the truth of it in our Permanent Experimental Field. It is only recently, however, that it has come to be recognised that barley may be grown profitably on a wheat stubble, in fact, we have averaged over the past 12 years, 30bush. 45lbs. per acre from barley crops thus placed.

We are referring to the so-called "Cape" barleys, and not to two-rowed varieties, known as malting barleys, so that in estimating the value of the above yield, we have allowed only 2s. 6d. per bushel, which gives a total of £3 17s. 3d. per acre gross return. We are bound to admit, therefore, that the barley crop has proved to be at least as profitable as the average wheat crop, and if we take into account the reduced expenditure incurred in preparatory work and seeding operations, the difference in favor of the barley crop will be increased. From a knowledge of these facts arose the desire to test barley under more accurate conditions of working, and it was therefore decided in 1911 to initiate a rotation of bare fallow-wheat-barley on a permanent basis. In this scheme, both wheat and barley receive 2cwts. per acre of superphosphate at seeding, and the crops are cut with the binder and put through an English thresher. The results to hand up to the present are as under:—

TABLE XLVIII.—*Showing Crop Returns from Bare Fallow—Wheat—Barley Rotation*, 1911-15.

| Year. | WHEAT. Grain per Acre. Bush. | lbs. | WHEAT. Total Produce per Acre. T. | C. | L. | BARLEY. Grain per Acre. Bush. | lbs. |
|---|---|---|---|---|---|---|---|
| 1911 | 24 | 12 | 1 | 19 | 3 | 43 | 9 |
| 1912 | 22 | 39 | 1 | 14 | 99 | 19 | 14 |
| 1913 | 7 | 12 | 0 | 11 | 43 | 9 | 16 |
| 1914 | 8 | 10 | 0 | 13 | 46 | 0 | 45 |
| 1915 | 26 | 20 | 2 | 5 | 18 | 38 | 21 |
| Means | 17 | 43 | 1 | 8 | 87 | 22 | 11 |
| Mean—Hay equivalent | — | | 1 | 15 | 10 | — | |

In the first place it is clear that so far there is no indication that the wheat yield has suffered any diminution through the inclusion of a second white straw crop. Thus, under the bare fallow-wheat-pasture system the mean wheat yield under a 2cwt. dressing of superphosphate for the period of 1911/1915 is 17bush. 6lbs., as compared with 17bush. 43lbs. in the rotation now under review. The corresponding hay yields are 1 ton 15cwts. 103lbs., and 1 ton 15cwts. 10lbs. per acre. The mean yield of barley is much below the farm average, but this is easily understood on looking into the nature of the seasons experienced since this rotation was started. Only five years' results are available, and in the case of two seasons the whole of the cereal yields were depressed through drought, whilst in 1912 the weather generally was less favorable to barley than wheat.

It is a matter for regret that we are not in a position to give grazing returns for this rotation. Being but one amongst many pressing operations demanding attention, the erection of divisional fences has had to wait its turn, and consequently actual records of the sheep-carrying capacity of the three plots concerned are not available. Nevertheless, we can arrive at the probable minimum value over the five-year period by applying the results obtained on other plots similarly circumstanced. For example, the wheat stubble grazing in this rotation will be approximately equal to that recorded in the 2cwts. superphosphate series of the bare-fallow-wheat-pasture rotation. In this instance, however, there will be no autumn feeding between the wheat and barley crops, as the land will be lifted early in preparation for the latter. The barley stubble is almost invariably better stocking than wheat stubble, but for our present purposes we will assume it to be equivalent. The autumn grazing after the barley stubble will also be better on the average than after a wheat stubble, so here again we will be safe in allowing an equal number of sheep per acre per annum. The fallow grazing will, as usual, be estimated at a quarter of a sheep per acre. By adopting these conservative estimates for grazing we are enabled to draw up a balance between the undermentioned rotations:—

TABLE XLIX.—*Comparing Gross and Net Returns from Bare Fallow—Wheat—Barley Rotation with those from the Bare Fallow—Wheat—Pasture Plots. The Dressing of Manure used, 2cwts. Superphosphate per acre on Cereal Crops*, 1911-15.

| | BARE FALLOW—WHEAT—PASTURE. | | | | | | BARE FALLOW—WHEAT—BARLEY. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Grain. | | | Hay. | | | Grain. | | | Hay. | | |
| | £ | *s.* | *d.* | £ | *s.* | *d.* | £ | *s.* | *d.* | £ | *s.* | *d.* |
| *Receipts*— | | | | | | | | | | | | |
| Crops | 2 | 19 | 10 | 3 | 2 | 10 | 3<br>2 | 2<br>15 | 0<br>7 | 3<br>2 | 1<br>15 | 5<br>7 |
| Grazing | 2 | 12 | 4 | 2 | 12 | 4 | 1 | 18 | 7 | 1 | 18 | 7 |
| Total receipts per acre for three years | 5 | 12 | 2 | 5 | 15 | 2 | 7 | 16 | 2 | 7 | 15 | 7 |
| Total receipts per acre per annum | 1 | 17 | 5 | 1 | 18 | 5 | 2 | 12 | 1 | 2 | 11 | 10 |
| *Expenditure*— | | | | | | | | | | | | |
| Rent at 10s. per acre | 1 | 10 | 0 | 1 | 10 | 0 | 1 | 10 | 0 | 1 | 10 | 0 |
| Cost of production | 1 | 15 | 0 | 1 | 15 | 0 | 3 | 0 | 0 | 3 | 0 | 0 |
| Total expenditure per acre for three years | 3 | 5 | 0 | 3 | 5 | 0 | 4 | 10 | 0 | 4 | 10 | 0 |
| Total expenditure per acre per annum | 1 | 1 | 8 | 1 | 1 | 8 | 1 | 10 | 0 | 1 | 10 | 0 |
| Balance of receipts over expenditure per acre per annum | 0 | 15 | 9 | 0 | 16 | 9 | 1 | 2 | 1 | 1 | 1 | 10 |

It should be noted under the bare fallow-wheat-barley rotation that the values of the wheat and barley crops are given separately, and in that order. The barley yield in the hay schedule is, of course, the value of the grain crop, since it is not the practice to make barley hay in this district.

The £3 charged under the item "Cost of production" is made up as follows:—Cost of producing wheat crop, £1 10s.; cost of producing barley crop, £1 1s.; cost of extra cwt. of manure for each of the above, 9s.; total, £3.

On looking at the final figures, which constitute a measure of the annual net returns per acre, the rotation including two cereal crops will be seen to present more attractive results than the one providing a year of forage. It is too soon to say that the balance-sheet is in any sense conclusive, but it is certainly interesting to find that even over a period during which weather conditions have been more than usually unfavorable to barley crops, the rotation under discussion is apparently the most profitable rotation yet introduced into this district.

### 4.—FOUR-COURSE ROTATION.

Originally there were two 4-course rotations in the experimental field, one suited for light land and one for heavy soil conditions. After a few years' experience it was found that neither of these were very suitable to the Roseworthy district, hence they were finally reported upon, and four of the plots were regrouped to make room for another 4-course system, comprising kale, barley, pease, and wheat. The kale is sown at the rate of 1¼lbs. per acre, and receives 10 tons farmyard manure at ploughing and ½cwt. bonedust at seeding. The wheat, barley, and peas are dressed with 1cwt. of superphosphate per acre, and the two former receive in addition ½cwt. of nitrate of soda. We are not yet in a position to submit and comment on the results of this rotation.

### 5.—FIVE-COURSE ROTATION.

#### (*a*) Bare Fallow-Wheat-Pease-Wheat-Barley.

This rotation will serve to show whether it is possible to farm Roseworthy land profitably without resorting to a bare fallow oftener than once in five years, and without giving up the land to temporary pasture of more than one year's duration. Pease constitute our most successful winter-sown grazing crop, and, as already demonstrated, the sowing of barley on the wheat stubble is justifiable on economic grounds. We therefore consider that the above scheme is as likely to succeed as any five-course system comprising four annual crops and one bare fallow. The rotation was inaugurated in 1911, and hence we are now able to record the mean results of the first complete cycle of operations. We may mention that the cereal crops all receive 2cwts. and the pea crop 1cwt. of superphosphate per acre.

Table L.—*Showing Crop and Grazing Returns from Bare Fallow—Wheat, Pease—Wheat- Barley Rotation,* 1911-15.

| Year. | GRAIN. | | | | | | TOTAL PRODUCE. | | | | | | GRAZING. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wheat. | | Wheat. | | Barley. | | Wheat. | | | Wheat. | | | Pease. Sheep per Acre. per Ann. |
| | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. | T. | C. | L. | T. | C. | L. | |
| 1911 | 15 | 17 | — | | — | | 1 | 14 | 21 | — | | | 2·18 |
| 1912 | 27 | 58 | 13 | 20 | 20 | 26 | 2 | 2 | 99 | 1 | 2 | 93 | 1·39 |
| 1913 | 6 | 48 | 4 | 6 | 8 | 5 | 0 | 13 | 108 | 0 | 11 | 70 | 1·04 |
| 1914 | 13 | 20 | 2 | 33 | 0 | 0 | 0 | 17 | 12 | 0 | 4 | 26 | 0·36 |
| 1915 | 22 | 12 | 23 | 1 | 38 | 4 | 2 | 2 | 31 | 2 | 5 | 34 | 1·84 |
| Means | 17 | 7 | 10 | 45 | 16 | 34 | 1 | 10 | 9 | 1 | 1 | 0 | 1·36 |
| Mean—Hay equivalent | — | | — | | — | | 1 | 10 | 0 | — | | | — |

The records of this rotation bid fair to be of unusual interest, as they tend to shed light on several important matters relating to cereal cropping. We may note in the first place that the average wheat yield after bare fallow in this system is 17bush. 7lbs., in the bare fallow-wheat-pasture group 17bush. 6lbs., and in the bare fallow-wheat rotation 15bush. 53lbs. There is, therefore, no evidence of depression in the yield of this component of the five-course rotation. When we pass on to consider the wheat crop that follows pease, however, we observe a totally different state of affairs. The mean yield in this instance has fallen to 10bush. 45lbs., which means a reduction of from 5bush. to 7bush. per acre. Combining the two wheat crops, we obtain an average production of 13bush. 56lbs., thus diminishing the difference by rather more than 3bush. per acre. Of course the influence of droughty conditions on the period 1911/1915 has probably been greater than would be the case normally, still it begins to appear likely that we shall have to resign ourselves to a certain shrinkage in the wheat harvest on this series of plots. Exactly the same conclusion will be reached if we examine the hay yields in a similar manner.

The mean figures for the production of barley are much too low to be regarded as typical of the yields that may be confidently expected under more normal weather conditions. This crop, more than likely, will be found to average from 25bush. to 30bush. at least, and it is problematical if it will ever have to be turned over to livestock again as happened in 1914.

This group of plots is located beyond reach of the water supply, and hitherto we have not been able to arrange for the collection of complete data in regard to the grazing value of stubbles and fallows. This defect we hope to overcome in the future, but meanwhile it will be instructive to allot values on the basis of observed results gathered from other plots, and to use the figures so obtained for the purpose of comparing this rotation with others. The grazing of the second wheat stubble will be of less value than that of the first crop, but on the other hand the barley stubble will carry more sheep than the first wheat stubble. If we accept these as compensating differences, and value the grazing of all the cereal stubbles at the same rate, we shall not be doing this rotation more than justice. For a money value of this grazing we will go back to the figures given for stubble feed in the 2cwt. of superphosphate series of the bare fallow-wheat-pasture rotation and adjust the calculations to suit the five-year period 1911/1915. By so doing, we find that the stubbles carried 0.91 sheep per acre per annum, and therefore the total grazing value of the three cereal stubbles amounts to the value of 2.73 sheep per acre. With respect to autumn grazing, there may be some available before the land is ploughed for pease, but our practice is to drill the pease in early, and hence we have included under autumn grazing only that which is available immediately before fallowing. On average figures this would be represented by 0.50 sheep per acre. The fallow grazing is counted equal to 0.25 sheep per acre, and the forage crop grazing has been shown above to be 1.36 sheep per acre. The total grazing, therefore, over the whole rotation will be fairly represented as the equivalent of 4.84 sheep per acre, which has a cash value of £3 12s. 7d. This means that a farm worked under this rotation would be able to return 14s. 6d. per acre over the entire area from sheep valued at 15s. per head, that is, very nearly a sheep to the acre.

Table LI.—*Showing Balance-Sheet of Receipts over Expenditure for Bare Fallow—Wheat, Pease—Wheat, Barley Rotation,* 1911-15.

| Receipts. | Grain Crop. | | | Hay Crop. | | |
|---|---|---|---|---|---|---|
| | £ | *s.* | *d.* | £ | *s.* | *d.* |
| First wheat crop | 2 | 19 | 11 | 3 | 4 | 2 |
| Second wheat crop | 1 | 17 | 7½ | 2 | 4 | 10 |
| Barley crop | 2 | 1 | 8 | 2 | 1 | 8 |
| Grazing | 3 | 12 | 7 | 3 | 12 | 7 |
| Total receipts per acre for five years | 10 | 11 | 9½ | 11 | 3 | 3 |
| Total receipts per acre per annum | 2 | 2 | 4 | 2 | 4 | 8 |
| Expenditure. | £ | *s.* | *d.* | £ | *s.* | *d.* |
| Rent at 10s. per acre | 2 | 10 | 0 | 2 | 10 | 0 |
| Cost of production— | | | | | | |
| First wheat crop | 1 | 14 | 6 | 1 | 14 | 6 |
| Second wheat crop | 1 | 4 | 6 | 1 | 4 | 6 |
| Barley crop | 1 | 5 | 6 | 1 | 5 | 6 |
| Pea crop | 1 | 5 | 6 | 1 | 5 | 6 |
| Total expenditure per acre for five years | 8 | 0 | 0 | 8 | 0 | 0 |
| Total expenditure per acre per annum | 1 | 12 | 0 | 1 | 12 | 0 |
| Balance of receipts over expenditure per acre per annum | 0 | 10 | 4 | 0 | 12 | 8 |

### (*b*) BARE FALLOW-WHEAT-LUCERNE (THREE YEARS).

This is the second of the five-course rotations, and is entirely different in type. It consists of a single wheat crop preceded by bare fallow, and followed by three years of lucerne pasturage. It is a rotation that can only be expected to compare favorably with others where stock and their products are saleable at highly remunerative rates. It appears, therefore, that the establishment of this scheme has taken place under distinctly propitious circumstances, and, given a few favorable seasons in which to establish the lucerne, the profits may even out-rival those from the bare fallow-wheat-barley course. The lucerne seed is broadcasted over the wheat immediately after seeding and lightly covered. It would be distinctly to the advantage of the lucerne if the wheat could be harvested as hay, but as this plan would deprive us of grain records, it is not feasible to adopt it. The results will probably be somewhat irregular as regards grazing, for in dry summer it is not possible to establish a lucerne sward without irrigation, and the plot sown to lucerne in a droughty year must feel the effects for the remainder of the cycle. To a certain extent the failure, partial or entire, of the lucerne crop will be counter-balanced by spontaneous growth, but the difference in feeding values between lucerne and natural herbage will be clearly reflected in the grazing returns. Only two years' results are to hand so far, and we therefore submit them without comment.

TABLE LII.—*Showing Cropping Returns from Bare Fallow, Wheat, Lucerne (Three Years) Rotation*, 1914-15.

| Year. | Grain Yield. | | Total Produce Yield. | | |
|---|---|---|---|---|---|
| | Bush. | lbs. | T. | C. | L. |
| 1914 | 5 | 26 | 0 | 9 | 90 |
| 1915 | 17 | 10 | 2 | 11 | 73 |

SUMMARY OF ROTATIONAL EXPERIMENTS.

In order that the comparative values of the different rotations, in so far as it is possible to express them in cash terms at the present juncture, may be conveniently studied, the subjoined table has been prepared. In the calculations for the older rotations only the results for the period 1908/1915 have been taken into account, and in the case of the more recently established plots the money values have reference only to the years 1911/1915 inclusive:—

## ROTATIONS.—SUMMARY.

TABLE LIII.—*Summarising the Total Annual Monetary Returns Per Acre from Land Worked Under Various Systems of Crop Rotation.*

| Rotation. | Period. | ANNUAL NET RETURN PER ACRE OVER WHOLE AREA. | | | | | |
|---|---|---|---|---|---|---|---|
| | | Wheat Crop Harvested for Grain. | | | Wheat Crop Harvested for Hay. | | |
| | | £ | *s.* | *d.* | £ | *s.* | *d.* |
| Bare fallow, wheat (1cwt. superphosphate) | 1908–1915 | 0 | 15 | 6 | 0 | 18 | 5 |
| Sorghum, wheat (1cwt. superphosphate) | " | 0 | 8 | 3 | 0 | 12 | 4 |
| Bare fallow, wheat, pasture (½cwt. superphosphate) | " | 0 | 14 | 0 | 0 | 17 | 3 |
| Bare fallow, wheat, pasture (1cwt. superphosphate) | " | 0 | 16 | 3 | 0 | 19 | 10 |
| Bare fallow, wheat, pasture (2cwts. superphosphate) | " | 0 | 18 | 1 | 1 | 1 | 0 |
| Bare fallow, wheat, pasture (3cwts. superphosphate) | " | 0 | 16 | 9 | 0 | 19 | 2 |
| Bare fallow, wheat, barley (2cwts. superphosphate) | 1911–1915 | 1 | 2 | 1 | 1 | 1 | 10 |
| Bare fallow, wheat, pease, wheat, barley (2cwts. superphosphate) | " | 0 | 10 | 4 | 0 | 12 | 8 |
| Bare fallow, wheat, pasture (2cwts. superphosphate) | " | 0 | 15 | 9 | 0 | 16 | 9 |

# THE POULTRY INDUSTRY.

## MARKET PROSPECTS AFTER THE WAR.

[By D. F. Laurie, Government Poultry Expert.]

During recent years there has been most satisfactory growth in the poultry industry. Not only have thousands of recruits joined the ranks of poultry breeders, but there is ample evidence of the general adoption of modern methods of breeding, rearing, feeding and housing poultry in all parts of the State. Not only have the suburban breeders adopted these methods, but still more satisfactory is the condition in which poultry are kept upon numerous farms. This big growth of an already big industry foreshadows the need for speedy organisation of markets in the interests of primary producers. The repatriation of soldiers and consequent land settlement in small holdings will bring about, in the course of a few years, a still more marked increase in production, and the need for exploiting oversea markets will be more urgent.

The basis of any commercial undertaking is the question of markets and competition. We have constantly been told that there is ample outlet in Australia for all the eggs now produced. That may be so at a price, but is that price invariably satisfactory to the producer? The answer, based on the expressed opinions of the breeders of the State, is decidedly no! The business man whose position enables him to express an unbiased opinion on these matters, calls attention to the well-known law of supply and demand. This law is not of local import only—its application is world-wide. Therefore, in common with producers as a body, the egg producers of the State are within their rights in seeking the most profitable outlets. At a push the Australian markets can absorb all our surplus; but without the steadying influence of outside markets the bulk of glut production will pass from the producer to the speculator. We are told that the future prosperity of the State depends on increased primary productions, and it might be added by the adoption of the most modern methods thereto. Without further emphasising the producers' viewpoint, it will further matters by inquiring into the chief oversea market for eggs—that is, in England. Optimists augur that one of the effects of the war will be the welding of the component parts of the Empire into a closer bond. If this is so, it is to be hoped that in the future preference will be accorded to Australian products.

### ENGLAND'S REQUIREMENTS.

The earliest figures obtainable and relating to England's imports of eggs and poultry are for the year 1852, when the sum of £252,000 was sent away. Since that time there has been an increase yearly in the number of eggs and poultry required, until the year 1913 the value was over 10½ millions sterling. Between the years 1892 and 1912 the number of eggs imported per head of the population had risen from 35 to 50 eggs; and the price per dozen had also increased from 7d. to 10.6d.

Average price paid for all eggs imported into England:—1905, 8.7d. per dozen; 1906, 9d.; 1907, 9.2d.; 1908, 9¼d.; 1909, 9.8d.; 1910, 9½d.;

1911, 10d.; 1912, 10.6d.; 1913, 10.6d. War was declared in August, 1914, and consequently the whole egg trade was dislocated. I do not, therefore, propose to use the figures, such as they are, for either 1914 or 1915—and those for 1916 are, of course, not yet available. America, during the war, has supplied England with enormous quantities of eggs at high prices. Prior to the outbreak of war, however, both the United States and Canada had ceased exporting eggs to Europe. As a matter of fact, early in 1914 America had established purchasing agencies in Ireland and North France in order to supply her own markets.

### SOUTH AUSTRALIA'S POSITION.

Let us now look at our own market records, which are based upon the bi-weekly market quotations published in the daily press by various commission firms.

Average market prices of eggs in Adelaide, January 1st to December 31st:—1905, 10.18d. per dozen; 1906, 9.58d.; 1907, 10.18d.; 1908, 11.05d.; 1909, 11.31d.; 1910, 11.04d.; 1911, 11.69d.; 1912, 12.96d.; 1913, 12.06d.; 1914, 11.37d.; 1915, 15.74d.

### PERIOD DURING WHICH THE STATE CAN EXPORT OVERSEA.

The foregoing table shows the average price realised by sellers of eggs in the city markets; and, of course, values are influenced by high prices in autumn and winter. The figures are given as items of interest, but what is of importance to know is the average price of eggs in Adelaide during the period when we can export. From September to the end of December each year prices are at the lowest level, for this is the period of highest egg yield; this factor is influenced largely by the heavy supplies received from farms where autumn and winter egg production is not a feature. The period is our glut season, and fortunately our geographical position allows us to export in our season of plenty, so that the eggs reach England when markets are bare and prices are at their highest.

Average prices realised in Adelaide markets during the period from September 1st to November 30th, and based upon the bi-weekly market reports (26 markets)—1905, 6.28d. per dozen; 1906, 6.14d.; 1907, 7.27d.; 1908, 8.15d.; 1909, 8.36d.; 1910, 7.27d.; 1911, 7.93d.; 1912, 9.77d.; 1913, 8.73d.; 1914, 7.85d.; 1915, 14.09d.; 1916, 8.92d. The 1915 figures reflect the disastrous drought, during which poultry throughout the State were sacrificed wholesale. There is an appreciable increase between the years 1905 and 1916; but there is no gainsaying the fact that the period under review is one of monotonously slack markets. There is just sufficient in the prospects of successful speculation to keep the markets at a bare level—the almost irreducible minimum. The slight rise is due, in my opinion, to cold storage facilities—the risks are less than in the old days of universal pickling; thus a slightly higher rate can be paid. When we look at the English figures we note that although a large proportion of the eggs imported are cheap, yet there must be, and of course is, a period of scarcity and of high prices.

### EGGS IN SHELL OR AS PULP.

It is my contention that we shall find a satisfactory market for all our surplus infertile first-grade eggs in England—shipped in the shell. The trial shipments years ago taught us what to do and what to avoid, and when the time comes all the facilities are available for prosecuting that portion of the egg export trade, and at a profit. It is admitted that grading and packing eggs in the shell is a costly proceeding, and that eggs so packed are bulky, and cold storage freight is expensive. Notwithstanding we cannot afford—in the interests of our breeders—to ignore the possibilities of that avenue of trade.

Egg pulp is by no means a new feature in the egg trade. Over 20 years ago I drew attention to the trade in Russian pulp sent to England. It has many attractions, such as low cost of handling, freedom from breakages, and comparatively easy shipment and low freight. Eggs in the shell must be carried at a constant temperature; in pulp they are frozen hard and can go in any cold hold. Eggs in the shell must be shipped in a separate chamber—not only because of special temperature requirements, but also on account of extreme susceptibility to taints, due to various strong-smelling items of general cargo. It may be definitely stated again that the ravages of war in Europe will mean a shortage of supplies for some years—the result will be a higher average price for eggs. The recently reported shipments of egg pulp aggregating about 60,000 dozens of eggs eased our markets and precluded a slump, and at the same time proved a very profitable investment to the shippers. We are thus opening up that branch of the trade at a time when England's requirements are imperative and prices high. It would, of course, have been more in the interests of the industry if the eggs had been shipped on behalf of the producers. For my own part I congratulate the shippers on their enterprise and on the excellent results. As pioneers they deserve all praise for helping to blaze a track in the world's markets.

It is becoming evident that the wonderful possibilities of poultry and egg production as a factor in our national prosperity are at length receiving general, if tardy, recognition.

In this respect we can go forward with confidence in the work of settling our soldiers on the land as poultry breeders. At a future date I shall give information about the export of table poultry, for which there will be a very satisfactory outlook.

## APPLYING A RED BLISTER.

The way to apply a red blister, consisting of one dram biniodide of mercury and seven drams lard—which is more effectual than mutton fat or vaseline—is to clip the hair short, put a little grease in the hollow of the heel to prevent the blister running into it, then to smear the blister over the joint all round and rub it in vigorously for at least 10 minutes; then to tie the beast up on a double pillar rein, so that it cannot get at the joint to gnaw it, or kick at anything with it, for 24 hours. After this lapse of time the joint should be well greased, and a few hours later washed with soap and warm water, dried, and greased again, and the beast turned out for a month.—Fras. Evelyn Place.

# ADVISORY BOARD OF AGRICULTURE.

The monthly meeting of the Board, held on Wednesday, 13th December, was attended by Messrs. F. Coleman (chair), G. R. Laffer, M.P., C. J. Tuckwell, W. J. Colebatch, J. Miller, A. M. Dawkins, Professor Perkins, and H. J. Finnis (Acting Secretary).

### CONGRESS RESOLUTIONS

Various resolutions which had been submitted to and passed by the annual Congress were further dealt with by the Board. In regard to the proposal that all cold stored, pickled, or imported eggs should be branded, the Minister of Agriculture intimated that the Government intended to take no action.

The Minister also intimated that the Government did not approve the suggestion that jetty and wharfage tolls should be abolished on goods travelling from port to port within the State, and that maintenance should be met by direct taxation.

### DRAINAGE AT BERRI.

The Director of Irrigation furnished a report dealing with the question of provision of a drainage scheme for the Berri Irrigation Area, and mentioned therein the steps which had been taken by the Irrigation Department to effectively dispose of surplus waters, and also the lines which had been followed in the direction of discouraging the use of water in quantities prejudicial to the well-being of the area.

### WOMEN'S COUNTRY CLUBS.

Further consideration was given to the proposals submitted by the Secretary at the September meeting in regard to the inauguration of a scheme for promoting education of women on the farms by means of the formation of clubs. Action was deferred until a later meeting.

### CONFERENCE OF DAIRY FACTORIES.

It was reported that a very gratifying response had been received in regard to the proposed conference of representatives of dairy factories, and it was decided to request the Government to provide free rail fares to enable the representatives of factories to attend the conference.

### WEST COAST GOODS TRAFFIC.

Consideration was given to a further minute from the Acting Railways Commissioner, dealing with the matter of transport of goods between the mainland and stations on the Eyre Peninsula railway. It was decided to seek information in reference to the practices adopted in other States in which similar conditions existed.

Eighty-six names were added to the rolls of existing Branches, and the Monteith Branch was formally closed.

# THE AGRICULTURAL BUREAU.

## THE TWENTY-SEVENTH ANNUAL CONGRESS.

*(Continued from page 399.)*

### Third Day—Wednesday, September 6th.

### CARE OF THE FARM MARE.

A paper by Mr. George Hill on the "Care of the Farm Mare" was read as follows:—

South Australia has just passed through one of the most trying times yet experienced by the majority of stockowners, and already the havoc played by the drought is being severely felt, raising the price of sheep and cattle to values that have exceeded the expectation of all. How long will it be before the horse market will receive its turn? Just at present the scarcity of money, and also the fact that sellers are asking cash payments for horse stock, are really pressing too hard on those that are struggling along, and patiently waiting for more capital from their last year's crop. Where terms are offered that will help a man over the coming harvest the market is very firm. When we take into consideration the horses purchased on account of the war—horses of good, sound ages—and the loss of thousands during the drought (and, further, it takes four years to put horses on the market), and the fact that very few breeders in South Australia have any young stock on hand, there must, without doubt, be a decided shortage in the course of a few years. Therefore it behoves all to take the greatest care of their mares and fillies, for they will find they will require them at a very early date. Some will say: "Look at the price of horses to-day; we are out of pocket by raising them. It is cheaper to buy than to raise them." No doubt it is at present if you only want the mongrel, as that class never brings the price of the good heavy draught. At present good draught horses, from three to five years old, are bringing from £30 to £35. This I consider is a good paying price for the breeder, but it pays always to try and raise the best. If you would rather have the mongrel to work, just keep a few good mares, raise good stock, sell them, buy the mongrel, and pocket the difference. Never breed the second rate horse. Now, as regards the care of the mare. This season we are hearing complaints from owners as to the small percentage of foals to be dropped. The owners of mares are inclined to lay the blame on the entire owners, but it must be remembered that if the mares are not looked after and well cared for they will not produce as many foals as the owners often desire. Mares must always, if possible, be kept in nice healthy condition, not be, as in a great many cases, that poor and weak they cannot do their part with success. Owners of mares should give every help to the man which is travelling the horse. This can be done in many ways. Always have your mares ready, see they are cleaned down, not muddy and sweating when the horse calls, and try if possible to spell them half a day after being served. You often hear such remarks as these when out with your horse: "Mr. So-and-So has good luck; he always gets all his mares in foal." Well, my advice is, take a hint from this man. You will find his mares are always in a nice healthy condition, always look fresh, and are never over-worked or over-driven at any time. When mares are near foaling always keep them at steady work, and at night put them by themselves and feed with bran and chaff. You will hear men say: "I had bad luck. My mare had a foal all right, but the other horses, I think, killed it." Not bad luck at all, but bad and careless management. Never turn a mare when near foaling out at night on to green feed after working. She will be hungry, the feed dewy and gassy, and you will undoubtedly have trouble if you do so. Mares that are not working do not get so hungry; they always eat during the day. But not so with the mare working.

When the mare has foaled, if about at the time see that the foal sucks as soon as it is strong enough. If young mares are nervous and restless, tie them up and assist the foal. Coax it by rubbing the rump, and coaxing it to get hold of your finger near the udder. When you get the animal's lips close enough, milk a little on to them, and once he gets a taste of the milk he will be anxious to suck. Never try to force the foal; remember the old saying: "One man can lead a horse to water, 20 cannot make him drink." The same applies to the foal. Should your mare retain her cleanings, give her a bran mash with a teaspoonful of aconite. Be sure she eats it up, and in the majority of cases it will make her pass the cleanings. Clean the mare down now and again for a few days; it will freshen her up. Rub the foal about so that he will not be frightened of you. If handled often when young he will never forget it. Never let the foal want for feed at any time. From experience I find that foals always kept in nice condition when growing make the best constitutioned horses and the mares are better for breeding. Stock that is starved at an early age never furnishes up to as nice a beast as the animal that never has had a setback. With reference to the stallion, use the best not the cheapest. If possible breed from the best breeding strains you can get; blood will tell. Do not be over enthusiastic on a horse that you see loaded with ribbons. The proof of the pudding is in the eating. With a horse it is his breeding, and time alone tells the tale in most cases. Some talk Suffolk, others Percheron, but I favor the heavy Clydesdale and the Shire. At present the horses that command the best prices are the good, heavy, cart horses These are always in good demand, and we must try and raise the horse for which there is the best demand. If there are buyers for gunners at a better price, well, breed for the market; but the market in every country is the same—that is, for the good, heavy, cart horse. The horse we want is the beast that will pull his load up a hill, shaft it down, do it at a fair pace, and stand it. To do this we must have weight and strength. Remember always try and breed a better beast than your neighbour rears.

### Discussion.

In the unavoidable absence of the writer of the paper, Mr. W. J. Colebatch, B.Sc., M.R.C.V.S., (Principal of the Roseworthy Agricultural College), replying to a number of questions which had been asked, said that the question of the earlist age at which to breed from mares was one on which there was difference of opinion. He thought three years was young enough. They were bred from at two years, particularly by stud breeders, where they wanted to find out the capacity of a mare as a breeder; but where that was done, they always endeavored to spare the mare the following year. For what term a mare should be spelled before foaling depended upon the temperament of the mare and the character of the work. On an average, he would say about a fortnight's spell before foaling would generally be of advantage to draught mares. In New Zealand it had been found that the man who caused the veterinary surgeons the most trouble was he who was too kind to his brood mares and did not work them at all. He had no faith in the system of calculating the time of foaling by the appearance of gum on the teats. In some cases it appeared right from the time of pregnancy. However, it might, if it appeared, say, at six or seven months, indicate that something had gone wrong with the mare. The cleansing of the mare was a most important thing at foaling time. If she did not get rid of her cleanings within 24 hours, then she would go through a critical time before she was right. He would advise breeders not to let their mares go in this regard more than 24 hours without giving them assistance. Speaking on the care of the foal, he said many foals were constipated at birth, and if that were not at once relieved the foal would not drink.

## CO-OPERATION.

A paper on "Co-operation," the joint work of Messrs. M. L. Nolan and P. H. Knappstein, was read by Mr. Nolan, as follows:—

Never, probably, in the history of Australia has the need for economy and saving, both public and private, been so pressing. A huge war expenditure, resulting necessarily in an immense increase of taxation, together with a shrinkage of income, the result of a drought of unexampled severity, present a problem the solution of which may well tax our energies to the utmost. The margin between expenditure and income, in other words, savings, must somehow be largely increased.

There are two ways by which this necessary end can be attained. One is by increasing our production, which, granted remunerative prices, would result in a corresponding increase of income. But this result is largely dependent on Nature, and so, to a great extent, beyond our control. The other is to reduce our outlay, so that by economy we attain the same end of an increased margin of savings. Here we are on surer ground, for this means rests largely with ourselves; and of all ways leading to this end none offers greater promise than co-operation.

Delegates may remember that a paper was read at the 1914 Congress advocating co-operative purchase of farm machinery, manures, &c., through Bureau Branches, which ultimately was referred to the Branches for consideration, with a view to its further discussion at the next Congress. Judging by *Journal* reports, the question has been very freely discussed by Branches, besides which nearly 100 have communicated directly with the Clare Branch on the matter. This general interest tends to show that producers are becoming more alert to the advantages of co-operative effort.

Before considering the matter further, it may be as well to refer to some misconceptions as to the nature of our proposal. What we suggested was that Branches should form themselves into co-operative unions for the purchase of all instrumentalities and requisites of production from wholesale houses and manufacturers direct, thus saving commissions and trade discounts. But some Branches, apparently thinking it applied only to manures, shelved further consideration, because the members had already bought all they needed. Were manures the only commodity to be purchased it would not be worth while, for the possible saving on that line is small, and not to be compared with that on machinery and general requisites. Others, again, were averse on the ground that there were other co-operative concerns in existence which should be supported. Yet our suggestion is certainly not opposed, but rather should be helpful, to the spirit of co-operation which finds concrete expression in co-operative businesses. But, if it be possible by combination for members and producers generally to make the savings indicated, it seems to us that they have a legitimate right to do so.

The principal points in favor of our proposal are:—

Simplicity and ease of working.
No capital required.
No risks.
Material financial gain.
Education in the advantages of co-operative union.

As regards the mode of working, one was indicated in the 1914 paper. But it has been suggested that were the Bureau to embark on an enterprise of this nature, it would be an unjustifiable departure from its original and real objects, and might attract opposition and enmity, and even cause discord in the Branches. To avoid the possibility of this, the members of a Branch could form themselves into a Co-operative Union, open to all producers, whether members of the Bureau or not. Such union would appoint one of its members as secretary, who would be the recognised agent for the wholesale houses and manufacturers and through whom all orders would pass. It would be preferable and more convenient were he a resident of the town. As the laborer is worthy of his hire, the secretary should be paid for his work, say, a proportion—to be agreed on—of the commissions and discounts saved.

This system would approximate fairly closely to that of the Farmers' Unions in Victoria, of which about 100 are in existence. These unions are formed of producers conveniently close to each other in various country centres to purchase direct from manufacturers and importers, thus saving the middleman's profit. A member is appointed agent by the various firms from which they wish to buy, as also by stock agents and insurance companies. These unions are regarded with favor by the big Melbourne firms. The savings made on purchases are paid to the individual purchasers. In saying that these savings would average from 7½ per cent. to 10 per cent. we feel sure we are on the safe side, and Victorian experience is confirmatory. These savings, and the object lesson presented by this simple form of co-operation, would probably lead to a great extension of the co-operative spirit, so that other phases of this many-sided movement would be gradually taken up.

The members of the Clare Branch have been practising this form of co-operation for the past two years on the basis outlined, and have found results, on the whole, commensurate with expectations. Our purchases covering a fairly wide range, appreciable savings have been made. Were the system to be adopted generally by producers, its field of usefulness would naturally be increased, as the majority of importing firms and manufacturers would probably come into line with the movement. Our experience has shown it to be a simple and practicable method of lessening costs to the man on the land, and we submit it to the favorable consideration of delegates and producers generally.

## FREE PARLIAMENT.

### FLAX FOR LINSEED.

In reply to a question, the Director of Agriculture, Professor A. J. Perkins, said that flax for linseed could be grown in the best districts, where the rainfall average was not less than 20in.

### IMPORTED EGGS.

Mr. E. W. Beythien (Longwood Branch) proposed—"That in the opinion of this Congress it should be made compulsory by law to mark or stamp all cold-stored, imported, or pickled eggs, when offering them for sale. And, further, that all importations of eggs, whether in shell or pulp, from China, be absolutely prohibited."

Mr. R. H. Cooper (Riverton Branch) seconded the motion.

After discussion it was decided to alter the word "China" to "Asiatic countries." It was further decided to divide the resolution into two parts—(*a*) that referring to the stamping of eggs, and (*b*) that referring to the importation of Asiatic eggs. Resolution (*a*) was carried, and resolution (*b*) was referred to the branches.

### F.A.Q. WHEAT STANDARD.

Mr. W. Cummings (Belalie North Branch) moved—"That in the opinion of this Congress it is desirable that the f.a.q. standard of wheat should be uniform throughout the Commonwealth."

Mr. W. J. Venning (Crystal Brook Branch) seconded the motion, which, after some discussion, was defeated.

### RABBIT DESTRUCTION.

Mr. V. W. Gardner (Koppio Branch) moved—"That in the opinion of this Congress it is desirable that Government inspectors, free of local control, be appointed to deal with the rabbit destruction question."

Mr. G. B. Gardner (Koppio Branch) seconded the motion.

Considerable discussion ensued, in which Messrs. J. K. Deer (Port Germein), T. O'Donohue (Amyton), A. O. Dawkins (Elbow Hill),

E. B. Pitman (Wirrabara), E. S. Matthews (Angaston), A. V. Nairn (Mallala), W. H. Smith (Naracoorte), A. Jamieson (Yongala Vale), and H. Sanders (McNamara Bore) participated, the general expression of opinion being adverse to the proposal.

The motion was lost.

## JUDGING AT AGRICULTURAL SHOWS.

Mr. John Gray (Claypan Bore Branch) moved—"That the judging of livestock and implements at agricultural shows subsidised by the Government should be on a system of points to be shown on cards."

Mr. G. S. Hayman (Lameroo Branch) seconded the motion, which was carried by a large majority.

## FERTILISERS IN BAGS.

Mr. A. Phelps (Clarendon Branch) moved—"That we urge upon the Government the necessity for provision that all fertilisers should be sold in bags, not exceeding 1cwt. in weight."

Mr. C. Ricks (Cherry Gardens Branch) seconded the motion, which was lost.

## GOVERNMENT SUPPLY OF CORNSACKS.

On behalf of the Bundaleer Springs Branch Mr. J. Laurie moved—"That as the Government have taken entire control of the disposal of wheat, we respectfully request that they also take control of the supplying of cornsacks."

Mr. J. Travers (Bundaleer Springs) seconded the motion.

The Minister of Agriculture said the Government made inquiries with reference to the price at which cornsacks could be landed in Adelaide. They were given to understand that the merchants were making very little profit on bags. If further proof were wanted, they had the Farmers' Co-operative Union handling cornsacks, and if they could deliver bags to them at bedrock prices there was no need for the Government to go into the business.

The motion was lost.

## JETTY TOLLS.

Mr. L. Aunger (Miltalie) moved—"This Congress is of the opinion that it is in the interests of the primary producer that all jetty and wharfage tolls should be abolished on goods travelling from port to port within the State, and that maintenance be met by direct taxation."

Mr. G. E. Opitz (Yaninee) seconded the motion, which was carried.

## VETERINARY LECTURER.

Mr. W. H. Smith (Naracoorte) proposed—"That it be a recommendation from this Congress that the Minister of Agriculture place at the disposal of the Government Veterinary Lecturer (Mr. Place) an automobile, to facilitate his movements through the country, thus enabling him to increase the good work he is carrying out."

Mr. C. Ricks (Cherry Gardens) seconded the motion. Carried.

## WHEAT FOR HOME CONSUMPTION.

Mr. C. S. Lee (Paskeville) proposed—"That this Congress disapproves of the action of the Wheat Board in fixing the price of wheat for home consumption at below the London parity."

Mr. W. R. Whittaker (Port Broughton) seconded.

The Minister of Agriculture said the wheat scheme had been entered upon primarily in the interests of the farmers, but also in the interests of Australia as a whole. Had it not been for the scheme bread would have been cheaper in Australia than it had been during the last nine months. If the motion were carried, it would be a dangerous thing. If an attempt were made to raise the price in Australia, it might result in a contrary effect, and lead to prices considerably below those now being obtained. It had been decided to allow the Bureau to nominate a representative to a seat on the Wheat Board, not because the Government lacked confidence in what had been done, but because it was desired that they should know what was going on, and have absolute confidence in what was being done.

The motion was negatived.

## BREAKING RAILWAY JOURNEYS.

On the motion of Mr. J. Brewster (Quorn) it was resolved—"That this Congress requests the Railways Commissioner to allow the delegates to break their forward journey on their Congress tickets."

## SOUTH AUSTRALIAN SOLDIERS' FUND.

On the motion of Mr. W. H. Richardson (Wynarka), it was resolved—"That every Agricultural Bureau member should set aside a definite acreage of the coming harvest, the proceeds from which should be devoted to the South Australian Soldiers' Fund."

## VOTE OF THANKS.

A vote of thanks was accorded to those who had read papers, to the officers of the Agricultural Department, the Minister of Agriculture, and the Chairman. The proceedings closed with the National Anthem.

# THE AGRICULTURAL OUTLOOK.

## REPORT FOR MONTH OF DECEMBER.

The following reports on the general agricultural condition and outlook of the areas represented by the Government Experimental Farms mentioned below have been prepared by the respective managers:—

*Booborowie.*—Weather—The beginning of the month was very wet, but the last fortnight has been fine with warm days and dewy mornings. Crops—The rains of this month, followed by the warm days, have tended to ripen the crops off rather more quickly than was expected, and reaping will be general by the beginning of the year. Natural Feed—Feed has remained green very late this year, and good green feed is still in the fields. Stock have been very free from illness and are in good condition. Pests—Brown beetles have appeared in swarms, and during the evening are like swarming bees.

*Eyre's Peninsula.*—The weather has been moderately cool, with only a couple of short, hot spells. Two light rains were recorded, registering 12 points, which have carried the total rainfall for the year over the 18in. mark. Winds have been plentiful, but fairly steady, and chiefly from the south and west. Crops—Harvesting has been in full swing all the month, but somewhat handicapped by the cool weather and lodged condition of some wheats. Some varieties have also shaken a portion of their grain, but, on the whole, the bulk of the grain is being secured. A good weighing sample of grain is being obtained, and yields are exceeding expectations, some plots of wheat registering over 30bush. to the acre, whilst it is anticipated that the average will be over 20bush. Natural feed is dry, but plentiful.

*Kybybolite.*—Weather—The wet conditions experienced in November continued up to the 14th instant, since when it has been fine and warm with southerly winds. Crops—Haymaking was delayed by the rain, and cutting will hardly be completed this month. The crops generally have ripened off very quickly, and it was impossible for farmers to get the hay cut before it was past the best stage of ripeness. Oats are now ready for stripping, also some early wheats. Diseases have been notable for their absence, and yields should be quite up to expectations. Natural feed has dried off, but is so abundant that great anxiety is felt from the danger of fires. Stock are in good order, sheep especially being much improved.

*Turretfield.*—The weather during the first half of December was very changeable, and unsuitable for haymaking. Up to the 14th 113 points of rain were registered. During the latter half of the month the weather became more seasonable. On the 27th a short thunderstorm accompanied by a heavy wind did considerable damage to the crops, but only 9 points of rain fell. Crops that were dead ripe and liable to shake lost a considerable amount of grain. Difficulty is being experienced in reaping the crops this season, as most crops have gone down more or less owing to the heavy weather in late spring. False combs are essential. All crops are turning out very well. Natural feed has dried off very quickly during the past fortnight, but there is still an abundance of it. Stock are healthy and in fair to good condition. Miscellaneous—Harvesting operations are in full swing. With the advent of hot weather all crops ripened very quickly, and the farmers had to start stripping before they had completed hay carting. A large quantity of hay is still lying stooked in the fields.

*Veitch.*—Weather—The weather has been remarkably cool, and very changeable for this time of the year; 109 points of rain have fallen during the month. Veitch average for the month is 68 points; total rain for year, 16.69; average for year, 12.53. Crops—Harvesting work is in full swing right through the district. Some of the early varieties of wheat are not standing the rough weather very well. Natural feed is drying off. Stock—All in healthy condition.

## DAIRY AND FARM PRODUCE MARKETS.

A. W. Sandford & Co., Limited, report on January 2nd:—

BUTTER.—A steady shrinkage in supplies of butter occurred during the month of December, and the export of first grade has consequently been prohibited. Seconds and thirds, however, continue to be produced in excess of local demand, and from all appearances there will be a surplus in these lines for some little time to come. In tops, South Australia is already importing from the eastern States to make up the shortage. Local rates, in prints, at the close of the month, in accordance with the Federal proclamation, were ''Alfa,'' 1s. 4½d.; ''Primus,'' 1s. 4½d. per lb.; while choice separators and dairies, 1s. 2½d. to 1s. 3½d.; well-conditioned store and collectors', 1s. 1d. to 1s. 1½d.; weather-affected lots down to 1s. per lb.

EGGS.—Consignments continued to arrive throughout the month in substantial quantities, and in the absence of any spells of hot weather the quality was, on the whole, satisfactory. Values have fluctuated slightly, rates being now a shade easier than they were a month ago, owing to picklers having concluded their operations. Quotations loose at mart—Hen, 9d.; duck, 10½d. per dozen.

CHEESE.—The consignments of cheese received during December again constituted a record, and under the stimulus of interstate orders prices hardened, ruling rate now being 8d. to 8¾d. per lb. for large to smaller sizes.

HONEY.—Demand for this line has maintained steadily, and in consequence values show no material alteration, being now 3½d. to 4d. per lb. for prime clear extracted, while beeswax continues to find ready sale at 1s. 5d. to 1s. 6d. per lb.

ALMONDS are very scarce, awaiting the arrival of the new crop. Prices are nominally—Brandis, 10d.; mixed softshells, 9d.; hardshells, 5d.; kernels, 1s. 7d. per lb.

BACON.—The usual December demand for both bacon and hams ruled, and market maintained at previous rates; best factory-cured sides, 11d. to 1s.; hams, 1s. 2d. to 1s. 3d. per lb.

LIVE POULTRY.—Supplies were quite equal to quantities coming forward this time 12 months ago, and for all quality birds good competition was experienced, very satisfactory prices ruling. Good table roosters, 4s. 6d. to 5s. each; nice-conditioned cockerels, 3s. to 3s. 6d.; plump hens, 2s. 6d. to 3s.; light birds, 2s. to 2s. 3d.; ducks, 2s. to 4s. 3d.; geese, 5s. 6d. to 8s. each; pigeons, 6d. each; turkeys from 9d. to 1s. 4d. per lb. live weight for medium to good table birds.

POTATOES AND ONIONS.—Large supplies of potatoes have come to hand from the Adelaide plains, and prices have eased to a point which must be exceedingly unprofitable to growers. In the Mount Gambier district digging operations have just begun, and according to the present outlook this State will not require to import potatoes for some months to come. ONIONS.—Locally-grown onions have also offered freely, and there are no indications of any falling off in supplies for another month or two. Potatoes, £4 10s. to £5 10s. per ton on rails Mile End. Onions, £6 to £7 per ton on rails Mile End.

## RAINFALL TABLE.

The following figures, from data supplied by the Commonwealth Meteorological Department, show the rainfall for the month of and to the end of December, 1916, also the average precipitation to the end of December, and the average annual rainfall.

| Station. | For Dec., 1916 | To end Dec., 1916. | Av'ge. Annual Rainfall |
|---|---|---|---|
| **Far North and Upper North.** | | | |
| Oodnadatta | 0·23 | 8·69 | 4·76 |
| Tarcoola | 0·03 | 7·92 | 7·58 |
| Hergott | — | 5·55 | 6·04 |
| Farina | — | 7·27 | 6·70 |
| Leigh's Creek | 0·54 | 8·43 | 8·66 |
| Beltana | 0·53 | 8·36 | 9·22 |
| Blinman | 0·34 | 12·62 | 12·83 |
| Hookina | 0·36 | 19·02 | — |
| Hawker | 0·42 | 17·99 | 12·22 |
| Wilson | 0·63 | 18·40 | 11·78 |
| Gordon | 1·23 | 14·44 | 10·26 |
| Quorn | 0·73 | 19·62 | 13·78 |
| Port Augusta | 0·66 | 11·13 | 9·46 |
| Port Augusta W. | 0·75 | 11·49 | 9·36 |
| Bruce | 1·10 | 13·07 | 10·01 |
| Hammond | 0·88 | 13·42 | 11·46 |
| Wilmington | 2·03 | 23·87 | 18·26 |
| Willowie | 0·95 | 15·60 | 11·90 |
| Melrose | 1·68 | 34·49 | 23·04 |
| Booleroo Centre | 0·74 | 19·88 | 15·83 |
| Port Germein | 2·27 | 15·98 | 12·84 |
| Wirrabara | 2·02 | 30·79 | 18·91 |
| Appila | 1·27 | 18·43 | 15·08 |
| Cradock | 1·26 | 13·74 | 10·86 |
| Carrieton | 1·18 | 16·04 | 12·22 |
| Johnburg | 0·67 | 12·04 | 10·21 |
| Eurelia | 0·82 | 17·40 | 13·24 |
| Orroroo | 1·85 | 17·73 | 13·42 |
| Black Rock | 1·26 | 16·23 | 12·25 |
| Petersburg | 1·24 | 17·95 | 13·07 |
| Yongala | 1·53 | 20·73 | 13·94 |
| **North-East.** | | | |
| Ucolta | 0·93 | 14·86 | — |
| Nackara | 1·09 | 11·76 | — |
| Yunta | 0·62 | 8·19 | 8·22 |
| Waukaringa | 0·39 | 9·64 | 7·94 |
| Mannahill | 0·45 | 8·34 | 8·46 |
| Cockburn | 0·59 | 9·35 | 7·97 |
| Broken Hill, NSW | 0·08 | 10·17 | 9·63 |
| **Lower North.** | | | |
| Port Pirie | 2·30 | 19·50 | 13·21 |
| Port Broughton | 0·37 | 19·84 | 14·33 |
| Bute | 0·86 | 22·88 | 15·42 |
| Laura | 1·58 | 24·01 | 18·22 |
| Caltowie | 1·39 | 22·30 | 17·27 |
| Jamestown | 1·65 | 23·64 | 17·46 |
| Gladstone | 1·71 | 20·80 | 16·00 |
| Crystal Brook | 1·48 | 22·97 | 15·62 |
| Georgetown | 1·59 | 23·25 | 18·32 |
| Narridy | 1·08 | 17·96 | 16·79 |
| Redhill | 0·65 | 21·80 | 16·79 |
| Spalding | 1·60 | 26·57 | 20·25 |
| Gulnare | 1·43 | 23·57 | 19·74 |
| **Lower North—*continued*.** | | | |
| Bundaleer W. Wks. | 1·76 | 24·18 | 17·29 |
| Yacka | 0·92 | 20·16 | 15·27 |
| Koolunga | 0·82 | 20·08 | 15·94 |
| Snowtown | 1·22 | 24·95 | 15·70 |
| Brinkworth | 1·24 | 23·89 | 15·48 |
| Blyth | 1·66 | 23·93 | 16·34 |
| Clare | 2·53 | 34·25 | 24·30 |
| Mintaro Central | 2·46 | 36·43 | 21·99 |
| Watervale | 3·66 | 41·28 | 27·17 |
| Auburn | 3·41 | 33·01 | 24·25 |
| Hoyleton | 2·59 | 24·26 | 17·96 |
| Balaklava | 1·27 | 19·20 | 16·03 |
| Port Wakefield | 1·25 | 19·14 | 13·13 |
| Terowie | 1·04 | 16·22 | 13·71 |
| Yarcowie | 0·95 | 17·48 | 13·91 |
| Hallett | 2·04 | 19·34 | 16·40 |
| Mount Bryan | 3·62 | 27·22 | 15·73 |
| Burra | 2·56 | 27·54 | 17·82 |
| Farrell's Flat | 1·93 | 25·57 | 18·87 |
| **West of Murray Range.** | | | |
| Manoora | 2·44 | 28·12 | 18·69 |
| Saddleworth | 2·18 | 24·50 | 19·69 |
| Marrabel | 1·60 | 31·27 | 18·94 |
| Riverton | 2·15 | 30·41 | 20·48 |
| Tarlee | 1·96 | 24·91 | 17·48 |
| Stockport | 1·76 | 24·85 | 15·89 |
| Hamley Bridge | 1·73 | 22·98 | 16·45 |
| Kapunda | 1·40 | 28·37 | 19·67 |
| Freeling | 1·62 | 25·96 | 17·85 |
| Greenock | 1·38 | 34·92 | 21·46 |
| Truro | 1·10 | 27·79 | 19·74 |
| Stockwell | 1·15 | 28·15 | 20·30 |
| Nuriootpa | 1·39 | 29·76 | 21·25 |
| Angaston | 1·11 | 32·51 | 22·25 |
| Tanunda | 1·12 | 29·59 | 22·28 |
| Lyndoch | 0·85 | 28·84 | 23·01 |
| Williamstown | 0·67 | 33·94 | — |
| **Adelaide Plains.** | | | |
| Mallala | 0·94 | 19·58 | 16·88 |
| Roseworthy | 1·28 | 23·07 | 17·31 |
| Gawler | 1·02 | 26·26 | 19·21 |
| Two Wells | 0·68 | 19·36 | 16·36 |
| Virginia | 0·99 | 22·88 | 17·58 |
| Smithfield | 0·87 | 22·22 | 17·30 |
| Salisbury | 1·23 | 25·62 | 18·57 |
| North Adelaide | 1·86 | 32·01 | 21·49 |
| Adelaide | 1·67 | 28·16 | 21·04 |
| Seaton (Grange) | 0·91 | 21·87 | — |
| Unley | 1·07 | 29·75 | — |
| Rose Park | 1·07 | 31·34 | — |
| Brighton | 1·24 | 29·96 | 19·93 |
| Glenelg | 0·85 | 23·75 | 18·35 |
| Magill | 1·03 | 27·82 | 25·69 |

## RAINFALL—*continued.*

| Station. | For Dec., 1916. | To end Dec., 1916. | Av'ge. Annual Rainfall |
|---|---|---|---|
| **ADELAIDE PLAINS—*continued.*** | | | |
| Glen Osmond | 1·27 | 34·45 | 25·26 |
| Mitcham | 1·08 | 30·88 | 23·47 |
| Belair | 1·26 | 34·84 | 28·64 |
| **MOUNT LOFTY RANGES.** | | | |
| Paradise | 0·82 | 27·53 | — |
| Teatree Gully | 0·94 | 33·82 | 28·19 |
| Stirling West | 2·12 | 56·39 | 46·70 |
| Uraidla | 1·52 | 55·66 | 44·35 |
| Clarendon | 1·20 | 37·49 | 33·67 |
| Morphett Vale | 0·62 | 27·28 | 23·32 |
| Noarlunga | 0·67 | 26·35 | 20 28 |
| Willunga | 0·86 | 29·94 | 25·98 |
| Aldinga | 0·64 | 24·40 | 20·34 |
| Myponga | 1·37 | 38·61 | — |
| Normanville | 0·71 | 26·30 | 20·65 |
| Yankalilla | 0·88 | 32·05 | 22·78 |
| Cape Jervis | 0·24 | 16·23 | 16·34 |
| Mount Pleasant | 1·04 | 34·95 | 26·87 |
| Blumberg | 0·82 | 36·57 | 29·38 |
| Gumeracha | 0·99 | 39·59 | 33·30 |
| Millbrook Reservr. | 0·84 | 41·00 | — |
| Lobethal | 1·16 | 45·69 | 35·38 |
| Woodside | 1·30 | 36·52 | 31·87 |
| Hahndorf | 1·20 | 35·84 | 35·45 |
| Nairne | 1·17 | 30·78 | 28·83 |
| Mount Barker | 1·69 | 39·06 | 30·93 |
| Echunga | 1·21 | 39·34 | 32·83 |
| Macclesfield | 1·42 | 36·64 | 30·72 |
| Meadows | 2·24 | 49·71 | 35·52 |
| Strathalbyn | 1·53 | 23·65 | 19·28 |
| **MURRAY FLATS AND VALLEY.** | | | |
| Wellington | 1·49 | 18·87 | 15·01 |
| Milang | 0·62 | 16·79 | 16·08 |
| Langhorne's Brdg | 0·69 | 15·80 | 15·27 |
| Tailem Bend | 1·67 | 18·48 | — |
| Murray Bridge | 1·42 | 15·82 | 14·32 |
| Callington | 1·12 | 18·18 | 15·65 |
| Mannum | 0·66 | 15·36 | 11·67 |
| Palmer | 0·58 | 18·38 | 15·60 |
| Sedan | 0·58 | 16·65 | 11·92 |
| Swan Reach | 1·57 | 15·58 | — |
| Waikerie | 0·49 | 12·54 | — |
| Blanchetown | 0·55 | 9·75 | 10·71 |
| Eudunda | 1·53 | 26·05 | 17·33 |
| Sutherlands | 1·06 | 17·34 | 10·60 |
| Morgan | 0·51 | 12·59 | 9·29 |
| Overland Corner | 0·76 | 10·60 | 11·42 |
| Renmark | 0·52 | 13·18 | 10·93 |
| Loxton | 0·88 | 15·57 | — |
| **WEST OF SPENCER'S GULF.** | | | |
| Eucla | 0·16 | 10·95 | 10 13 |
| White Well | 0·09 | 11·89 | 9·67 |
| Fowler's Bay | 0·23 | 14·50 | 12·11 |
| Penong | 0·15 | 19·19 | 11·93 |
| Murat Bay | 0·08 | 14·20 | — |
| Smoky Bay | 0·07 | 14·30 | — |
| Streaky Bay | 0·05 | 15·89 | 15·31 |
| Port Elliston | 0·47 | 18·98 | 16·49 |

| Station. | For Dec., 1916 | To end Dec., 1916. | Av'ge. Annual Rainfall |
|---|---|---|---|
| **WEST OF SPENCER'S GULF—*continued.*** | | | |
| Port Lincoln | 0·82 | 24·18 | 19·88 |
| Tumby Bay | 0·55 | 17·30 | 15·00 |
| Carrow | 0·65 | 19·40 | — |
| Cowell | 0·38 | 13·07 | 11 76 |
| Point Lowly | 1·42 | 15·02 | 12·21 |
| Petina | 0·16 | 14·57 | — |
| Hummock Hill | 0·99 | 14·61 | — |
| Talia | 0·41 | 19·41 | — |
| Cummins | 0·30 | 22·18 | — |
| Arno Bay | 0·26 | 15·65 | — |
| Cleve | 0·09 | 17·01 | — |
| **YORKE'S PENINSULA.** | | | |
| Wallaroo | 0·45 | 18·98 | 14·05 |
| Kadina | 0·53 | 22·42 | 15·88 |
| Moonta | 0·36 | 22·13 | 15·22 |
| Green's Plains | 0·81 | 21·18 | 15·73 |
| Maitland | 0·50 | 30·66 | 20·08 |
| Ardrossan | 0·35 | 19·82 | 13·89 |
| Port Victoria | 0·66 | 22·78 | 15·20 |
| Curramulka | 0·33 | 21·22 | 18·51 |
| Minlaton | 0·56 | 25·71 | 17·41 |
| Stansbury | 0·47 | 21·18 | 17·06 |
| Warooka | 0·48 | 23 10 | 17·71 |
| Yorketown | 0·33 | 21·92 | 17·47 |
| Edithburgh | 0·40 | 22·78 | 16·48 |
| Port Vincent | 0·28 | 20·56 | — |
| **SOUTH AND SOUTH-EAST.** | | | |
| Cape Borda | 1·17 | 29·74 | 25·09 |
| Kingscote | 0·75 | 23·19 | 18·95 |
| Penneshaw | 0·63 | 22·76 | 21·34 |
| Cape Willoughby | 0·97 | 27·85 | 19·69 |
| Victor Harbor | 1·03 | 22·37 | 22·18 |
| Port Elliot | 1·06 | 21·71 | 20·33 |
| Goolwa | 0·97 | 22·99 | 17·93 |
| Pinnaroo | 1·01 | 21·15 | 16·74 |
| Parilla | 0·66 | 19·25 | — |
| Lameroo | 1·82 | 22·29 | 16·55 |
| Parrakie | 1·25 | 18·59 | — |
| Geranium | 1·43 | 22·06 | — |
| Peake | 1·42 | 21·77 | — |
| Cooke's Plains | 0·90 | 21·87 | 14·74 |
| Coomandook | 1·16 | 24·14 | — |
| Kalangadoo | 2·17 | 36·85 | 18·87 |
| Meningie | 0·87 | 24·78 | 17·49 |
| Coonalpyn | 1·21 | 23·33 | 16·80 |
| Tintinara | 2·15 | 25·68 | 18·78 |
| Keith | 1·63 | 22·69 | — |
| Bordertown | 1·50 | 22·42 | 19·76 |
| Wolseley | 2·67 | 23·77 | 17·72 |
| Frances | 1·97 | 21·58 | 20·74 |
| Narracoorte | 1·39 | 24·79 | 22·60 |
| Penola | 2·11 | 28·80 | 26·78 |
| Lucindale | 1·55 | 23·90 | 23·32 |
| Kingston | 1·54 | 25·89 | 24·73 |
| Robe | 1·11 | 30·45 | 24·69 |
| Beachport | 0·96 | 33·54 | 27·51 |
| Millicent | 1·81 | 36·76 | 29·25 |
| Mount Gambier | 2·00 | 32·96 | 32·00 |
| C. Nrthumberland | 1·46 | 29·40 | 26·63 |

# AGRICULTURAL BUREAU REPORTS.

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| Balaklava | * | — | — |
| Beaufort | * | — | — |
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| Belalie North | * | — | — |
| Berri | 509 | 10 | 7 |
| Blackheath | 510 | 6 | 3 |
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| Blyth | * | 13 | — |
| Bookpurnong East | * | — | — |
| Booleroo Centre | * | — | 3 |
| Borrika | * | — | — |
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| Brentwood | * | 4 | 1 |
| Brinkley | 509 | — | — |
| Bundaleer Springs | * | — | — |
| Burra | * | — | — |
| Bute | * | — | — |
| Butler | * | — | — |
| Caltowie | * | — | — |
| Canowie Belt | * | — | — |
| Carrieton | * | — | — |
| Carrow | * | — | — |
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| Goode | 505 | — | — |
| Green Patch | * | — | — |
| Gumeracha | * | — | — |
| Halidon | * | — | — |
| Hartley | 517 | 8 | 7 |
| Hawker | 499 | 9 | 6 |
| Hilltown | 501 | — | — |
| Hookina | * | 2 | 6 |
| Inman Valley | 511 | 16 | 1 |
| Ironbank | † | — | — |
| Julia | * | — | — |
| Kadina | * | — | — |
| Kalangadoo | * | 13 | 10 |
| Kanmantoo | 517 | 6 | 3 |
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| Mindarie | * | — | — | Port Pirie | * | — | — |
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| Minnipa | 505 | 13 | 10 | Ramco | 508 | — | — |
| Mintaro | 500 | 6 | 3 | Redhill | * | — | — |
| Mitchell | * | — | — | Renmark | * | — | — |
| Monarto South | 510 | | — | Riverton | * | — | — |
| Monteith | * | — | — | Roberts and Verran | * | — | — |
| Moonta | * | — | — | Rosenthal | * | — | — |
| Moorlands | * | — | — | Rosy Pine | * | — | — |
| Morchard | 498 | — | — | Saddleworth | * | — | — |
| Morgan | 510 | — | — | Salisbury | * | — | — |
| Morphett Vale | * | — | — | Salt Creek | * | — | — |
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| Mount Bryan | * | — | — | Sherlock | * | — | — |
| Mount Bryan East | * | — | — | Spalding | * | — | — |
| Mount Compass | * | — | — | Stirling's Well | † | — | — |
| Mount Gambier | * | — | — | Stockport | * | — | — |
| Mount Hope | 505 | — | — | Strathalbyn | 516 | 2 | 6 |
| Mount Pleasant | * | — | — | Sutherlands | | — | — |
| Mount Remarkable | 498 | — | — | Tantanoola | * | — | — |
| Mundalla | * | 10 | — | Tarcowie | * | — | — |
| Mundoora | * | — | — | Tatiara | * | — | — |
| Murray Bridge | ‡ | — | — | Tintinarra | * | — | — |
| Mypolonga | * | 3 | — | Two Wells | * | — | — |
| Myponga | * | — | — | Uraidla and Summert'n | * | — | — |
| Myrla | * | — | — | Waikerie | ‡ | — | — |
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| Narrung | * | — | — | Whyte-Yarcowie | * | — | — |
| Netherton | 507 | — | — | Wilkawatt | * | — | — |
| North Booborowie | * | — | — | Willowie | * | — | 6 |
| North Bundaleer | * | — | — | Wilmington | * | — | — |
| Northfield | * | — | 6 | Wirrabara | 501 | — | — |
| Orroroo | ‡ | — | — | Wirrega | * | — | — |
| Parilla | * | 4 | 1 | Wollowa | * | — | — |
| Parilla Well | * | — | — | Woodleigh | * | — | — |
| Parrakie | * | — | — | Woodside | 516 | — | — |
| Paskeville | * | — | — | Wynarka | * | — | — |
| Penola | * | — | — | Yabmana | * | — | — |
| Penong | * | 13 | 10 | Yacka | * | — | — |
| Petina | * | — | — | Yadnarie | 504 | — | — |
| Pine Forest | * | — | — | Yallunda | * | — | — |
| Pinnaroo | * | — | — | Yaninee | * | — | — |
| Pompoota | 507 | 11, 25 | — | Yeelanna | * | — | — |
| Port Broughton | * | — | — | Yongala Vale | * | — | 5 |
| Port Elliot | 514, 517 | 20 | 17 | Yorketown | * | — | — |
| Port Germein | * | — | — | | | | |

* No report received during the month of December. † Formal report only received.
‡ Held over until next month.

# ADVISORY BOARD OF AGRICULTURE.

## Date of Meeting—February 14th, 1917.

# THE AGRICULTURAL BUREAU OF SOUTH AUSTRALIA.

**Every producer should be a member of the Agricultural Bureau. A postcard to the Department of Agriculture will bring information as to the name and address of the secretary of the nearest Branch.**

**If the nearest Branch is too far from the reader's home, the opportunity occurs to form a new one. Write to the department for fuller particulars concerning the work of this institution.**

# REPORTS OF BUREAU MEETINGS.

## UPPER-NORTH DISTRICT.

### (PETERSBURG AND NORTHWARD.)

### MOUNT REMARKABLE.

December 6th.—Present: 10 members.

Co-operative Butter Factory v. Private Dairy.—Commencing with the declaration that a butter factory could be kept in operation in that district throughout the year, Mr. G. Casley, in a paper dealing with the relative merits of the co-operative butter factory and the private dairy, said that now that the Government had purchased the Willowie Estate, comprising some of the best land, an effort should be made to establish a factory there, because of its central situation, and if the proposed training farm for soldiers were successful it could keep the factory going itself. The railway could now carry the milk in cool cars, whereas formerly, if the weather were hot it had to be taken to Laura by night. If the Government would not build a factory one could be erected by the farmers for £1,000, and with another £250 for incidental and working expenses, the sum of £1,250 would be required. Within a radius of six miles from the factory there were between 25 and 30 fairly sized private dairies, or families partly engaged in dairy pursuits. If 25 families subscribed £50 each, all of which would not be required at once, the requisite amount would be provided. When the factory was established the only work on the farm would be to feed and milk the cows and cart the milk to the factory. By arrangement the farmers could collect the milk on their side of the factory week about. Then one class of butter only would be produced instead of 25 different kinds; the butter would be done up in uniform style and a better price would be obtained. In nearly all private dairies there was some drawback, and the work of milking, feeding, cleaning, skimming, churning, making up the butter and taking it to the store made a continuous round of work for fully 50 people, whereas, in a factory, only half a dozen were employed—a great saving of labor. Mr. S. Challinger said that the cost of labor was too great for farmers to make the milking of many cows profitable. Mr. H. S. Brumby said that the collection of the milk could be managed by the farmers carrying it week about to the factory. Mr. W. H. McGuire said that in the district in New South Wales from which he came a factory costing £1,100 treated the produce of 500 cows. Mr. N. S. Giles said that in New South Wales he had noticed stagings upon which the milk or cream cans stood waiting for the carrier of the week to lift them into his vehicle and take them to the factory.

### MORCHARD (Average annual rainfall, 11in. to 12in.).

November 18th.—Present: 15 members and two visitors.

Pigs on the Farm.—The essentials in profitable pig raising, premised Mr. F. Scriven in a paper entitled, "Pigs on a Farm," were plenty of feed, given regularly, and a clean, well-ventilated warm sty. To thrive well pigs should be fed three times per day, and they would do well on wheat, barley, or pease with plenty of clean, fresh water. For a pig yard, he preferred about half an acre of dry land, fenced strongly with heavy wire netting. A line of barbed wire should be laid about 2in. below the surface, and the netting should be fastened securely to it. That would prevent the pigs burrowing underneath. In one half of the enclosure a stone sty with a straw roof should be built and divided into two compartments sufficiently large to house a sow and litter or three pigs for fattening purposes.

In the yard, a small straw stack should be placed for the use of the pigs as they wished, and it would be found very warm for them in cold weather. The other portion of the yard should be used for growing green feed. If sown with barley or rape to catch the first rains and kept closed until the crop was well started, the pigs running out would do well on the green feed with little else. Mr. Kitto disapproved of using wide-meshed wire netting for pig yards. Mr. H. Brown said that wire netted pig yards required to be securely constructed. Mr. G. Gregory said that pigs thrived better in yards than in close quarters. Mr. J. W. Riechstein thought that sows should not be mated until 10 months old. Pigs should be given plenty of charcoal. Mr. B. S. McCallum considered that sows with young should be given as much food as they could eat. Mr. H. G. Kupke observed that pigs with good sides should be selected for ham and bacon. Bacon pigs should not be more than 12 months old.

The Hay Harvest.—It was necessary to prepare for hay cutting some time before the crop was ready, observed Mr. B. S. McCallum in a paper on the hay harvest. The twine, duplicate parts, and oil should be in hand days before required, and the binder thoroughly overhauled. The hay yard also needed attention, and all refuse, such as damaged straw, &c., should be removed. All green growth should be cleared off. The base for the stack should be covered with timber if possible, but if timber were difficult to obtain a thick layer of straw might answer the purpose. Old kerosine tin buckets, filled with stones, made very good weights for affixing to the wires placed over the stacks, and if well cared for, would last for years. The paper then proceeded to deal with the matters that should receive attention in connection with the harvesting of the crop. Discussion followed, in which Messrs. J. W. Riechstein, F. Scriven, Kitto, Brown, W. Tigden, and R. Jasper took part.

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HAWKER, November 14th.—Mr. H. C. Condon read a paper entitled "Why farmers do not attend the Bureau," in which he pointed out the good work which was possible if the farmers came together and presented a united front on all matters which concerned them. The Agricultural Bureau afforded a means for the farmers to come together, but they did not avail themselves of its advantages sufficiently.

## MIDDLE-NORTH DISTRICT.

### (PETERSBURG TO FARRELL'S FLAT.)

### BEETALOO VALLEY (Average annual rainfall, 18in. to 19in.).

November 13th.—Present: six members and one visitor.

Poultry Breeding.—After recommending White and Brown Leghorns, Minorcas, and Andalusians as layers; Wyandottes, Orpingtons, and Plymouth Rocks for general purposes; and Brahmas, Dorkings and Game for table birds, Mr. W. Berry, in a paper on poultry breeding, advised that in breeding for egg production the settings should be from the middle of June to the end of September, because the birds from those hatchings would commence laying in April, when eggs were dearest. Table birds should be hatched from March to August, in order to be ready for October to Christmas, when they would realise the best prices. In that district, owing to the proximity of the Port Pirie market, which absorbed large quantities of table birds, the general purpose fowl was most profitable. He preferred to secure two or three good breeds, and to permit them to run together, not keeping them shut up, because they thrived better at large. Old stock should be quitted quickly. In commencing, it was well to lay out a few pounds in good birds and breed up. Much of the success of poultry raising depended upon feeding. For egg production, a warm mash should be provided in the morning when the weather was cold, with dry wheat in the evening. For fattening the birds should be kept growing, where they could have a good run and then placed in small pens 6ft. x 4ft., and topped up. They should not be kept too long in the pen, or they would commence to lose weight and depreciate in three days as much as they had gained in three weeks. Old laying hens which might be tough, if "topped off" in that way, would be much improved. Perches infected with tick should be burned and fresh ones supplied. Examination of the fowls' toes whilst on the roost at night would disclose the presence of the pest. Mr. Flavel preferred the crossbred fowls on the farm, because they were hardier and less subject to disease.

Cereal Growing.—To grow grain successfully, remarked Mr. A. Bartrum in a paper on cereal growing, it was absolutely necessary to prepare the ground thoroughly and that was best done by fallowing. Early fallow was best in the hilly country of that district, because it gave the winter rains a better chance to soak into the soil instead of running away to waste. The depth to plough was 4in. to 5in., and the ground should be cross harrowed soon afterwards. The cultivator should be used freely to keep down weeds. For early wheat he preferred Gluyas, King's White and King's Red. For a medium early and general wheat Carmichael's Eclipse and Federation were best, and for late wheat Marshall's Select and Yandilla King. For oats in that district he certainly recommended Algerian, because they were reliable, and gave good returns for grain and hay. Cape oats made better hay than Algerian, but were not so reliable, and had a tendency to go down badly. They were also very much subject to smut. Generally speaking, Cape barley gave the best returns, but it was not always an easy matter to find a market for any quantity. On the other hand, there was nearly always a good market for a good sample of malting barley, of which Duckbill and Chevalier were the best varieties. Barley and oats were best sown on stubble or grass land, and grown on fallow. He advised the three years' system—one year fallow, one in crop, and next year grazing, where the holdings were large enough, but the trouble in that district was that the holdings were too small, and most of them had to go in for one year fallow and the next for crop. Seed wheat should be carefully selected, and should be rust resisting, free from smut, well graded, and pickled at least one month before being sown. Oats should be sown early in May, using 1½bush. of seed per acre and about 1cwt. of super. Barley for grain should not be sown early if a good crop of grain were expected. It required to be grown quickly. For Cape 1½bush. of seed per acre, and for malting 1bush. should be used. Mr. W. Berry considered Federation one of the best wheats for that district. Mr. Flavel said that he always sowed 100lbs. of super. with Gluyas and Marshall's Hybrid as the best varieties of wheat.

## MINTARO.

December 9th.—Present: 32 members and five visitors.

Various Methods of Harvesting.—In harvesting, remarked Mr. R. Garrard in a paper on various methods of harvesting, it should be borne in mind that wheat did not improve after it had ripened, and that the sooner it was in the bags and carted out of the paddock the better. He believed that if it were possible it would pay to have wheat carted as soon as it was in the bags, providing the distance was not too great, say up to five or six miles, and the price of wheat was not below 3s. 4d. per bushel. The gain in weight would be more than enough to pay for carting, and it would then be away from birds and the danger of fire. Other small details worth considering were that the spreading out of bags a few days before use would make them hold more wheat, and make them very much easier to sew, and they would not require so much jumping when being filled. It was not well to be in too great a hurry on a cool or damp morning, because much wheat could be wasted when it was tough. It was not wise to try and reap when the wheat would not break off easily with the hand, but when it was fit not a moment should be wasted. Everything should be ready, the machine in good order, and the nuts, etc., tightened up. There were five methods of harvesting which he knew of, and they were—(1) The reaping machine and winnower, (2) the complete harvester, (3) the reaper thrasher, (4) the binder and header, (5) the binder and thrasher. He dealt with the advantages and disadvantages of each, and expressed a preference for the complete harvester for that district. Mr. R. Kelly did not consider the complete harvester an ideal machine. Mr. H. Schunke believed that the reaping machine and a motor winnower on the co-operative system would be a good harvesting scheme. It would not be necessary to wait until the wheat would thrash, but as soon as it could be got off the straw it could be reaped and kept in heaps until cleaned. Mr. C. J. H. Wright considered it wiser to cut one-fifth of the crop and thrash it and conserve some of what would be otherwise burnt stubble. Wheat could be stacked and then left in a heap for a year before being threshed, and no harm would come to it. Mr. T. J. Hogan did not favor the binder and thrasher. Hay was too cheap to store, when there was plenty of self-sown to be had for the carting. It was a good plan to have a good stack of straw for a lean year. Mr. A. Lowe said that the farmers in Scotland made as much money out of straw as they did from grain by feeding it to cattle.

HILL TOWN, November 27th.—Mr. A. A. Lehmann delivered an address on ensilage. He referred to the overhead, pit silo, and stack systems of ensilage. In the Riverina district of New South Wales it was customary to take out silo pits with a horse scoop, 20ft. in length, 10ft. in width, and 6ft. in depth, with upright sides and a sloping bottom. Drays with the ensilage were driven into the excavation, and the load spread about. The drays continued driving in over the fodder, until the pit was filled. A horse was kept walking around the edge of the ensilage to ensure the pit being evenly filled. When full, a large portion of the earth taken out of the pit was shovelled on to the ensilage to weight it down and exclude the air. Very little of the fodder was damaged by the soil, especially if the pit were located on high ground. Almost any kind of green fodder and herbage made good ensilage. He had seen good ensilage made from artichokes, and cattle relished it. In the discussion which ensued, the opinion was expressed that a silo such as Mr. Lehmann had described would be a failure in that district, because the ground was too wet. All agreed that ensilage was good fodder for milch cows.

WIRRABARA, November 11th.—Mr. B. C. Joppich read a paper on the care of farm machinery, recommending the selection of machines in accordance with the class of country in which they were to be used. It ruined machinery to work it with loose bolts or nuts. All bearings should be in proper position, and well oiled. When the work of the machine had been completed it should be overhauled, all tension springs released, and placed under cover. The woodwork should receive a coat of paint every two or three years. Machine sheds with stone walls and iron roofs were safest, but were not so cool as straw.

## LOWER-NORTH DISTRICT.

### (ADELAIDE TO FARRELL'S FLAT.)

### LONE PINE.

November 7th.—Present: 17 members and seven visitors.

Care of the Working Horse.—Fresh air and healthy sanitary conditions were as necessary for the wellbeing of the horse as for mankind, remarked Mr. Walter Schmaal, in a paper on the care of the working horse. The stable, he continued, was the house of the horse, and it was necessary that it should be clean and sanitary. The floor should have a gradual slope, allowing the wet to run into a channel and drain off outside the stable. Every horse should be cleaned every morning with a currycomb and a hard brush. That promoted cleanliness, stimulated the circulation of the blood, created warmth, and conduced to health. Crushed oats and chaff made excellent food for working horses. Crushed oats were easily digested, and if they and chaff were damped the feed was more palatable and digestible. It was well, after bedding up a horse at night, to give it an armful of hay in a manger. In summer an armful of grass, &c., cooled the blood and kept the horse in condition. A good feed of oats should be given at least once a day, to keep up the heat of the body and enable it to withstand the cold weather. Water should be given at least three times a day. Farmers had to contend with sore shoulders in their horses, the causes of which were badly fitting collars, wet weather, too high or too low hames, and mismanagement of feed. Collars should be exact in their fit, and always used on the same horse. They should be cleaned daily by having the dirt scraped off, but when sores occurred collars should not be cut. The hames should fit well on the collar to allow an even pull on both sides. Horses with sore shoulders should not be washed after work.—Mr. J. A. Butfield advocated washing round the sores when the shoulders were affected, and the application of oil or ointment. Mr. F. Fromm recommended washing the shoulders of horses harnessed for the first time with vinegar, as it hardened the skin. Mr. E. Minge was averse to feeding horses with sore shoulders with oats, because they were heating, and retarded healing. Mr. T. Lehmann said that oats made little difference to a horse with sore shoulders.

## LONE PINE.

December 5th.—Present: 20 members and eight visitors.

Mixed Farming.—In a paper dealing with mixed farming, Mr. Hilton Schwarz said that a farm with an area of 300 to 600 acres should be divided into three parts, one-third for crop, one-third for feed, and one-third for fallow. He advocated fallowing to a depth of 3in. or 4in., and in the following year the fallow should be worked to a greater depth, but in the third year the working should not be so deep. Oats should be grown to keep the land in heart for wheat crops. A team of nine or 10 horses would be required. Two or three ponies should be kept, and two or three foals raised every year. A flock of 150 or 200 sheep should be kept. Their droppings fertilised the land and increased the crops, enabling the farmer to keep more sheep. That meant more lambs and the greater enrichment of the land. Sheep were quite as profitable, if not more so, than dairying, though the returns were not so quick and regular. At least half a dozen cows should be kept on the farm, and it should be arranged that some should calve in April and some in November, in order to provide a regular source of income. Summer fodder should be grown for the dairy cows. Pigs should be kept, one breeding sow, and four or five pigs for killing. Every farmer should keep from 100 to 120 fowls, and every farm should be equipped with a blacksmith's shop. An outfit costing £20 would provide all that was necessary. By effecting his own repairs a farmer could save from £30 to £40 per annum. Mr. C. Beechmann considered that every farm should contain a few acres of vineyard and orchard. A few geese, ducks, and turkeys should also be kept. Mr. F. Fromm said that 200 sheep could be kept on 600 acres by constant change from grass paddocks to fallow, and thence to stubble paddocks.

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## MALLALA (Average annual rainfall, 16.88in.).

September 12th.—Present: 10 members.

The Horse.—Horses were divided into five definite and distinct classes, which had been well preserved, remarked Mr. T. Weatherill, in a paper on the horse. First there was the hunter, the product of a blood horse and a half-bred mare, a strong animal, capable of undergoing great fatigue; then there was the racehorse, proceeding directly from the mating of an Arabian sire with an English mare, which had been bred by a similar cross. That was called the highest blood. Thirdly, they had the coach horse; fourthly, there was the draught horse; and, fifthly, horses of no particular character, the result of accidental crossing among the rest. The roadster, which was used for travelling, was more difficult to obtain in perfection than either the hunter or the racer. It was one of the most useful animals of which the country could boast, and should be produced in greater abundance. The draught horse, for the farmer, was the most important breed of all, and great improvements had been made in it. The staple diet of horses required close attention. Oats and hay should be fed to horses doing heavy work, and bran, linseed, and carrots should be used. Bran was a laxative, and should be given only in the form of a mash at the end of a day's hard work. Carrots carefully cleaned might be given occasionally in small quantities. They maintained the blood in good order, and allayed febrile symptoms induced by the dry fodder, on which horses usually subsisted. Oats should be bruised and given midday and evening. Horses should have access to water at all times, day and night, and a fresh supply should be kept up. In that way horses would drink less than if watered at stated times, and would keep in better condition. In ordinary cases horses should be watered at least four times a day. It was a cardinal rule in horse management that they should be watered before being fed. The contrary practice was liable to produce colic. The reason was simple enough. Water did not remain in the stomach, but merely passed rapidly through it, on its way to the caecum. If the stomach were full, the water was apt to carry with it from the stomach into the small intestines some of the food before it was prepared for transmission. Undigested food acted on the intestines as a foreign body, and produced irritation. Horses might be watered with safety immediately after work, even though heated. A good grooming down or slight exercise might be advantageous.—Members generally agreed with the views expressed in the paper, and that the horse, being indispensable to the farmer, deserved better treatment than it frequently received.

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LYNDOCH, December 7th.—Discussion took place on "The Fruit Prospects for the Coming Season," "Prevalence of Various Diseases," and "Effect of Hail on Fruit Trees and Vines."

WATERVALE, December 9th.—A discussion took place on the cincturing of currant vines, and members generally favored the operation, but considered that it was best to make the ring around young vines without taking out the piece of bark. In older and stronger vines the bark should be removed. The stronger the vine the wider should be the cut. The operation should be carefully performed.

## YORKE PENINSULA DISTRICT.

### (TO BUTE.)

### MINLATON (Average annual rainfall, 17.41in.).

November 10th.—Present: nine members.

**Homestead and Outbuildings on the Farm.**—A paper on the homestead and outbuildings on the farm was read by Mr. R. H. Tilbrook, in the course of which he set out that the first point to decide, after purchasing an unimproved farm, was the selection of a site for the erection of a homestead. That should be built near a main road, and also in a convenient position to work the farm economically. The house should be built of stone, having high walls and plenty of ventilation. Having selected the site for the house, equal thought should be given to laying out the farm outbuildings. They should be placed well away from the house, and always at the back. Assuming that the farm comprised about 1,000 acres, the stable should be big enough to stable at least 16 horses and provide a couple of loose boxes. It should be built of stone, with an iron roof. By placing the stable and chaffhouse under the one roof money would be saved and it would be more convenient. The hay yard should be close behind the stable, and enclosed with a stone wall 4ft. high. The implement sheds and barn should be at least 100yds. away from the stable. It was inadvisable to have all sheds connected, owing to the danger of fire. If the barn were constructed with an entrance at both front and back, with a gable roof, a leanto on either side would provide good implement accommodation, blacksmith shop, &c. It was well to have sliding doors to the implement shed in order that implements might be moved in and out with little trouble. Water for the stock should be handy to the homestead. The gateways should be wide, and made of iron. Good sheep-proof fences should be erected. Trees should be planted around the house, but not near enough to interfere with the garden or underground tanks. Discussion followed, and it was agreed that the homestead should not be too near the road or boundary, and that stone buildings were preferable to any others. In place of one wide gate it was considered more convenient to have a double gate.

## WESTERN DISTRICT.

### KOONIBBA.

December 7th.—Present: 10 members.

**Care of Horses.**—In a paper on the care and feeding of horses, Mr. W. Post said that a good, warm stable should be provided, with separate stalls, a neck rope, and a good manger, in order that all horses might get their own feed. Horses should not be permitted to run loose in the yard. Some of the horses would get most of the feed, and proper work could not be expected from a horse which did not get sufficient feed. Horses should be fed with judgment, and at right times, because it was not always the quantity of feed which fattened the horse, but the regular feeding and watering. Horses should not be turned out over night at seeding time, unless there was abundance of feed in the paddock. They could not do a day's work if they were walking the paddocks all night looking for feed. If kept in at night they should not be given more feed than they could clean up by 12 or 1 o'clock. For the remainder of the night they should rest. He preferred hay as feed at night. Young stock or idle horses should not be driven from the yards when the workers were being fed, but they should have a little feed also. Hoofs should not be permitted to grow too long, because that often caused lameness and soreness. Nor should they grow too bare before shoes were put on. Should that happen, however, the nails should not be driven too tightly, or a piece of leather should be inserted between the hoof and the shoe. The back of the shoe should have a little spring in it, or corns might be caused. Stockholm tar applied to the hoofs tended to prevent cracking. On no account should a collar be changed from one horse to another. Members agreed that half to three-quarters of a ton was sufficient load for a horse on the roads in that district. It was agreed that fair treatment, good feeding, and good driving were the essentials in obtaining a staunch team.

## YADNARIE (Average annual rainfall, 14.09in.).

December 9th.—Present: 10 members.

Qualifications of a Farmer.—The farmer's calling, declared a member, in a paper dealing with the qualifications of a farmer, was one of the most honorable, useful and difficult. The farmer required to be a good judge of land and have the ability to determine how to work the various classes of soil on his property. With judicious tillage and discrimination in the uses of fertilisers and the selection of crops, even poor land might be made to produce profitable returns, but injudicious treatment of the same land might easily prove ruinous. He regretted that ploughing matches had gone out of fashion, because good ploughing was not only satisfactory to look at, but was also a factor in successful cultivation. If the land were properly turned with the plough it was better for the rest of the farm machines, which necessarily followed right up until the harvest was completed. Bad ploughing, with high crowns and corresponding hollows was just the reverse. With such land, the seed in the hollows was likely to be injured by too much moisture, and the plant on the ridges suffered from excessive evaporation. Ploughing matches were as important as stock shows, and deserved more consideration at the hands of those interested in agricultural pursuits. There had been great progress of late years in labor-saving agricultural implements; and an up-to-date farmer had to make good use of his brains before becoming expert with them all, because many of them were very complicated. In dairying—a most important branch of farm work—the farmer required to be skilled, observant, and painstaking. The selection and breeding of stock. the feed and treatment of the cows, and the handling of the dairy products, all required sound judgment and much knowledge. In that connection the necessity for scrupulous cleanliness in connection with all dairy work should be emphasized. That also applied to the treatment of pigs and poultry, and, as a matter of fact, to the land, because it was advisable to keep the land as free from weeds, &c., as possible. The farmer who possessed much stock also required a fair knowledge of the symptoms and treatment of the more common complaints to which they were subject, because at times it was impossible for him to obtain the assistance of a veterinary surgeon. The farmer should also possess integrity and industry. He required to be methodical, and attend to his duties throughout the year. If he did that he would get through an immense amount of work with satisfaction to himself, and without feeling tired and overworked. On the other hand, if he permitted work to be put aside, he would find that he could not recover lost time, except by rushing and scamping his work. Many farmers disregarded social obligations, but it was a mistake, because a man who practically cut himself off from his fellow-man was not a good nor desirable citizen. A farmer's avocation required brains and intelligence, and the necessity for education was therefore apparent, but was frequently neglected by the rural community. The more knowledge a farmer possessed the better were his chances of success. Mr. J. J. Deer considered that it was essential for a farmer to be not only master of one branch of the business but of all. Education was important, because the farmer was a commercial man, and it was requisite that he should keep a diary as a guide from one year to another. An uneducated farmer was under great disabilities. Mr. W. L. Brown was of opinion that bookkeeping was necessary for successful farming. Mr. E. C. Kruger affirmed that the facilities for education of the children of outback settlers should be further extended. Mr. W. Jericho observed that the man of no education was in his right place on the land. He would not expect a man with a college education to become an ideal farmer. Mr. W. F. Banks urged the advantages of education, but said that he knew sheep farmers, who had practically no education, who were successful. Mr. A. A. Dreckow said that education was necessary for all trades and callings, but the child should be educated for the walk in life which it was anxious to follow. Mr. S. H. Kruger considered the suggestion of a diary a very good one.

GOODE, October 9th.—Mr. E. S. Stephenson read a paper on profitable side lines, urging that sheep, cattle, pigs, poultry, and vegetables should be grown on every farm. In that district, farmers were at a disadvantage in that there were no reliable markets for their produce. Once the local demands had been supplied, there was no outlet for their products. Mr. W. Folland suggested the crediting of butter, eggs, pork, &c., against groceries, vegetables, and fruit, and they would find that the credit side preponderated. Mr. W. G. Morcombe said that fowls were profitable, but he was averse to crossing.

KOPPIO, December 12th.—Mr. T. Brennand, in a paper on the care of agricultural implements, said that the best time to effect repairs and alterations was when the machinery and implements were not in use. The blacksmith could do the work much better if given reasonable time, instead of being rushed. Painting woodwork was the best preservative yet discovered, and was not merely for appearance sake. Even a coat of linseed oil applied to wheels was beneficial in the same way as grease or oils improved harness. In the discussion which took place, members agreed with the views expressed in the paper, and considered that machinery should be overhauled as soon as it had finished work for the season. Failing that, a note should be made of repairs required in order that they might not be overlooked.

MINNIPA, November 25th.—Mr. L. J. Cook delivered a short address, taking as a subject, "Why We Till the Soil."

MOUNT HOPE, November 17th.—A paper was read by Mr. W. Mahoney on haymaking, in which he advocated a careful overhaul of the binder and all its parts and appliances and the necessary supply of oil and binder twine before commencing operations. By inserting the handle in its place, the whole of the mechanism should be easily set in motion with one hand. If there were any difficulty it would probably be with the knives. All the blades should be sharp and in good order, or the draught would be much heavier and cause unnecessary wear on chains and sprockets. In working the binder the reel should be adjusted so that the crop would fall naturally on the elevator. Sheaves should be moderate in size and be tied about one-third of the length from the butt. He preferred hay somewhat on the matured side. It should be stooked immediately after the binder, and stooks should be round and comprise 30 or 40 sheaves. The heads of the sheaves should be close together, with the butts outward, at a slight angle, which rendered them safe against wind or rain. Mr. R. Myers would cut the crop on the ripe side, especially oats. Mr. T. Speed peferred green hay, even if necessary to add grain. Mr. T. Myers would not put too many sheaves in a round stook, because of the danger of the hay becoming musty.

WARROW, November 25th.—Mr. J. G. Cowan read a short paper on the feeding and care of horses, in which he advocated the provision of a good, warm stable, because warmth was half the battle in feeding. A useful ration for, say, nine horses, would be at night when brought home from work a kerosine tin of whole oats, and the same amount of crushed oats, with two bags of chaff. If hay chaff were not available, cocky chaff would do. Two sheaves of long hay should be fed to each horse for the night. Horses did better on long hay than chaff if given time to eat it. Stables should be kept clean, and there should always be a plentiful supply of clean water. In the discussion which ensued members generally agreed with the views expressed in the paper, except that they preferred short feed instead of long hay.

## EASTERN DISTRICT.

## (EAST OF MOUNT LOFTY RANGES.)

### KI KI.

December 9th.—Present: nine members.

SUITABLE FARM SHEEP.—In face of the fact that sheep are realising record prices and the high rates ruling for fencing material, every farmer, remarked Mr. H. Redman in a paper on the importance of sheep on the farm, and types suitable for the district, should keep a few sheep, no matter how few he commenced with. It was better to begin with too few than too many. The class of sheep he recommended was strong-woolled Merinos, with short legs, big girth, ribs well sprung, and carrying a deep, shafty fleece with plenty of character. That type of sheep had a good constitution, was a good doer, cut a good fleece, and when past its prime in wool production, provided a good carcass to fatten for the butcher. If the fat lamb industry were preferred, the Southdown or Shropshire should be crossed with the Merino. They matured very quickly, were good mothers, and prolific breeders. If wool and carcass production were desired the Leicester-Merino cross was an excellent one. The Romney Marsh-Merino cross also did well in wet districts, they resisted foot rot and fluke, and were prolific breeders. Having decided on the class of sheep to be bred, some aged ewes should be secured from a well-founded flock of good repute. He perferred the aged ewes to two-tooths, which were mostly culls. Good strong, robust rams should be secured. Thoroughness in every detail was imperative in the management of sheep. He advised the breeching of the sheep before the green feed arrived, because it avoided the soiling of the wool, and removed a harbor for flies. Sheep so treated, especially if immediately sprayed with dip, were rarely attacked by flies. All sheep should be regularly dipped every year, with powder dip, within a month or six weeks after shearing, when the wool would be long enough to absorb and retain sufficient of the dip to prove effective during the year. Abundance of feed and water were essential, and it was wise to provide a trough of bonemeal. The sheep might not take to it at first, but they would soon clear out the trough. In killing and dressing the carcass should be completely stripped, because every extra pound of wool increased the value of the skin. Great care should be taken to prevent the blood staining the neck of the fleece. Unless sheep were skinned immediately after being killed blood would collect in the veins and stain the pelt. The hand should be used more than the knife, to avoid cutting the skin, which should be dried in the shade and washed with arsenic to ward off weevils and flies. When thoroughly dried (not before) the skins should be packed for market.

### KINGSTON-ON-MURRAY.

December 15th.—Present: 14 members and five visitors.

FRUIT GROWING.—An address on fruit growing generally was delivered by Mr. G. W. Beverley, of Pyap Estate. In the first place, he advised good, deep ploughing, and a crop of some sort should be sown, if possible barley, to sweeten the soil and prevent young trees or vines making too vigorous growth. In selecting nursery stock care should be taken that the parent stock was well matured, and was a good cropper, because in the majority of cases the offspring followed the characteristics of the parent stock. In rooted vine cutting only one cutting should be taken from the rod, and that close to the end severed from the vine. He preferred the square system of planting, especially with vines, because all trellis posts could be brought into line without danger of clashing with vines in any row. A fair distance for planting fruit trees was 20ft. x 20ft., and for vines (currants, sultanas, and Gordos), 8ft. x 12ft. Lime applied to the soil was a valuable factor in releasing plant food, and was also a sweetening agent. In cincturing currants a broad incision ¼in. was advised in order to ensure a complete severance of the bark. Sultanas should be cinctured when the fruit was set. Oranges gave good results by girdling, which might be effected by placing a piece of tin around the trunk and then twisting wire as tightly as possible around it. The tin prevented the wire from cutting into the bark. The wire should be left in position until the fruit was well set.

## McNAMARA BORE.

November 11th.—Present: six members.

**Clearing Burned Mallee Scrub.**—The cheapest and easiest method of clearing burned mallee scrub four or five years old, ready for cropping, observed Mr. T. E. Bennier in a paper on clearing mallee scrub, was to obtain a log 20ft. in length and 8in. in diameter and hitch to it two horses, tandem fashion, in order that they might be driven through the mallee without any trouble. The logging down should be carried out in the same direction as it was intended to plough. The ploughing should be done with an eight or 10-furrow disc. Anything likely to stake the horses should be removed by hand. A fair amount of draught was required on the disc in order that the horses might work more evenly. The discing should be about 3in. deep in order to turn the ground over. The work should be done in July or August, whilst the ground was wet. A fair amount of draught would remove about two-thirds of the shoots, and, in the following October, he would harrow with a heavy set of harrows, driven in an opposite direction to the ploughing in order to tear off a few more shoots. The slasher should be put to work in January. A double row fire rake could be used in February, in order to carry fire all over the ground, sweeten the soil, and kill the rubbish. After the fire rake the harrows should be used, and then about half a bushel of wheat drilled in straight, with about 56lbs. of high-grade super. A mid-season wheat should be sown. Whatever small sticks were on the ground would be caught the following year with the fire rake, and after that a share plough could be used with ease. Mr. W. Paterson would rake before harrowing, because the rake pulled off more shoots. He also recommended using a shutter or door fixed to the axle of the stripper, because it flattened down the stubble, and made a better burn. In answer to a question Mr. Bennier said that he would plough with a share plough without logging where the burnt mallee was small.

## NETHERTON.

November 18th.—Present: six members.

**Subdividing the Farm.**—In a paper on subdividing the farm Mr. E. Brown recommended commencing clearing in a corner and gradually working along the boundary. Paddocks should be about 100 acres in area, otherwise much time would be wasted in mustering stock. In fencing, the straining posts should be about five chains apart, and if ordinary posts were not available, T iron standards, 4ft. 8in. in height, should be used. They should be driven 1ft. into the ground, and be 9ft. or 10ft. apart. Three barbed wires should be used, 1ft. apart, the topmost being on the cap of the post. Such a fence should restrain ordinary great stock, and to make it sheep proof it would be necessary only to add two plain wires, the first placed 8in. below the lowest barbed wire, and the other one 7in. lower down than that. The wire should be strained on a hot day, being then less liable to break in straining, and likely to keep in order much longer. Members generally agreed with the views expressed in the paper. Mr. C. Wilson said that straining posts should be 10 chains apart, because wires were maintained more tightly in long strains. Wooden posts should be put in every chain with iron standards between. Two barbs were sufficient in a fence to retain great stock.

## POMPOOTA.

November 23rd.—Present: 30 members and two visitors.

**Gardening on Swamp Land.**—In preparing swamp land for growing vegetables, declared Mr. O'Callaghan, in a paper on gardening on swamp land, it should be ploughed deeply, then harrowed well to break up clots and ensure a firm bottom, rolled in the same direction as the furrows, and again harrowed until the soil was reduced to a fine tilth. Any variety of vegetables would grow on the Murray swamps, which were naturally rich in humus, but might need a dressing of potash and nitrogen fertilisers. Green manuring was one of the best methods of fertilising and improving land exhausted by continuous cropping, and where stable manure was not easily obtainable. No plant was so good as the pea for that purpose. In warm climates the cow pea was, without doubt, the best plant for green manuring. Planted when the ground was warm, they soon yielded an enormous crop of green stuff, which was of very high manurial value when rotted and incorporated in the soil. Concentrated and powerful manures should never, in a fresh state, come into contact with seed or the roots of young plants. The first considerations were the proper time and manner of sowing, and securing good seed. It was poor economy to buy cheap seed, which might not germinate, and if it did grow, produced mixed varieties. Sowing should be in drills, of the greatest length the garden would permit. The work of thinning and hoeing might then be carried out more conveniently. In most cases, when seeds did not grow, the fault was with the sowers, who did not know the proper time to sow different kinds of seeds. In sowing seeds, common sense should be exercised. Whilst many kinds of vegetable seeds, such as onions, peas, &c., could be sown with safety as early in spring as the ground could be prepared, other kinds would perish entirely. It was common to see crops of roots for winter use running to seed through being sown too early, and other vegetables coming in faster than they could be used or sold, with none to succeed them. To overcome those mistakes the beginner should keep a minute account of his work as a guide for future proceedings. A garden site should be a well-drained piece of land, because vegetables would not grow on sour or ill-drained ground. When irrigating, all the plants should be given a thorough soaking once or twice a fortnight. It did more harm than good to be always sprinkling the top surface, because the roots of all plants would be merely on the surface instead of going deep into the soil. To secure the best results in the vegetable garden, it was necessary that different kinds of crops should follow each other. Under no circumstances should cabbage follow cauliflower, or carrots succeed parsnips. Each crop should be as dissimilar as possible from its predecessor. The variety of vegetables to be grown would be controlled by the distance from market and the means of transportation. For those far distant from a railway, potatoes and onions would be the most profitable crops.

### RAMCO.

November 6th.—Present: eight members.

THINGS WHICH PAY ON A BLOCK.—There were many differences of opinion as to the cost of various operations on a block, remarked Mr. T. Lewis, in a paper entitled ''Things which pay on a block,'' and it was well to have the exact facts and figures for examination. The subjects he had chosen for demonstration were as follows:—(1) Two-horse versus one-horse ploughs; (2) two-horse versus one-horse cultivators; (3) horse hoeing versus hand hoeing; (4) selling fresh versus selling dried fruit; and (5) distillery versus drying lexias. In calculating the expenses in connection with those matters he had put labor down at 9s. per day and horse hire at 2s. 6d. per day. The orchard worked was taken to be 15 acres. The figures worked out as follow:—Table I.—Single-furrow plough versus two-horse double-furrow plough—Cost of single-furrow plough, £3 10s.; interest on capital (7 per cent.), 5s.; depreciation (10 per cent.), 7s.; ploughing 15 acres twice, £15; total, £15 12s. Cost of double-furrow plough, £10; interest on capital (7 per cent.) and depreciation, £1 4s.; ploughing 15 acres twice, £9; total, £10 4s. Balance in favor of two-horse plough, £5 8s. The single-furrow plough did better work as a rule in the orchard, especially in old ground. Table II.—One-horse cultivator versus two-horse cultivator—Cost of one-horse cultivator, £2 10s.; interest and depreciation, 8s. 6d.; furrowing out 15 acres five times at 2s., £7 10s.; cultivating in 15 acres five times at 2s. extra, £11 5s.; total £19 3s. 6d. Cost with extra parts of two-horse cultivator, £20; interest and depreciation, £3 8s.; furrowing out 15 acres five times at 1s. 2d., £4 7s. 6d.; cultivating in 15 acres five times at 1s. 2d., £4 7s. 6d.; total £12 3s. Balance in favor of two-horse cultivator, £7 0s. 6d. The two-horse machine did better work as a rule because it was more rigid and had not the same tendency to run round large weeds. He had put the cost of cultivating for one horse to even the work done with the large machine, because it cultivated right across between the furrows in one operation, whereas it took more with the smaller machine. Table III.—Horse-hoeing versus hand-hoeing—Cost of a horse-hoeing machine, £5; interest and depreciation, 17s.; horse-hoeing 15 acres at 2s., £1 10s.; finishing by hand at 3s., £2 5s.; total, £4 12s. Hand-hoeing 15 acres at 10s., £7 10s.; total, £7 10s. Balance in favor of the machine, £2 18s. The machine made a far cleaner job, because it shifted the weeds bodily, including roots, and it was noticeable that when the machine had been used, there were always fewer weeds the following year. Table IV.—Fresh apricots versus dried apricots, 1916 prices (six tons fresh fruit equals 1 ton dried fruit)—Six tons fresh fruit at £12 per ton, £72; less picking and handling, £6; net total, £66. One ton dried apricots, £85 13s. 4d.; less picking, handling, £6 13s. 4d.; cutting, £6 13s. 4d.; interest and depreciation, £3; sulphur, 5s., equals £16 11s. 8d.; net total £69 1s. 8d. Balance in favor of dried apricots, £3 1s. 8d. The cost of cutting was based on 2d. per 3ft. x 2ft. tray, which, in his opinion, was not sufficient. Cost of picking £1 per ton was simply an estimate, because he could find no figures for a basis. Table V.—Distillery proportion of lexia crop. Gross value of one ton of lexias in bags, £38.—Fresh lexias versus dried lexias.—Fresh—3½ tons fresh fruit at £5 2s. 6d. per ton at 14 Beaume, £17 18s. 9d.; less picking and carting, £3 10s.; net total, £14 8s. 9d. Dried—One ton in bags, £38; less picking and handling, £3 10s.; interest and depreciation of plant, £1 16s.; bagging, £1; freights, £1 10s.; brokerage, £1 18s., making £9 14s.; net total, £28 6s. Balance in favor of dried, £13 17s. 3d. Animated discussion followed, and members were practically unanimous in agreeing with the writer as to implements. Mr. Stanley pointed out that where two horses and larger implements were employed the work was completed so much more quickly that the saving in time, which he could utilise on other work soon paid for the machinery. In table IV. (apricots) Mr. Stanley said that he would sell fresh in spite of the slight advantage on the dried fruit, because a lot of worry was avoided, and the returns were received earlier, and he thought the trees were better, because there was less sugar taken. In Table V. (distillery proportion), Mr. J. J. Odgers pointd out that the writer had taken the value of dried at an exceptional season, for £38 per ton in bags was an abnormal figure. The usual custom was for the local executive of the Dried Fruits Association to fix a minimum price at which fresh fruit sold could count as export. Last year it was fixed at £4 10s. per ton 15 Beaume, and was calculated on the preceding year's dried price of £22 per ton.

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BERRI, December 7th.—Mr. H. E. Laffer (the Viticultural Instructor) delivered an address dealing principally with the vine and the effect of various fertilisers upon it and upon its fruit.

BRINKLEY, November 7th.—A homestead meeting was held at Messrs. Pearson Brothers' farm. An inspection was made of the crops, of which about 300 acres of well-worked fallow, sown after the rain, showed to the best advantage. About 12 acres of lucerne, sown in the driest season on record, had germinated well and become firmly rooted, promising good crops of green feed in the summer.

COONALPYN, October 6th.—Mr. W. J. Spafford (Superintendent of Experimental Work) delivered an address, and said that in that district, with such good soil and a good local rainfall, crops up to 30bush. of wheat might be expected when the land had been cleared and well worked. He had been most impressed with the need for cultivation. At least three cultivations were required between the fallowing in, say, July, and the seeding in April. If lack of time prevented such treatment of say 300 acres, then he was confident that it would prove profitable eventually to crop only an area which could be treated in that way, even if it were only 200 acres. The best time for seeding in that district was from the middle of April to the end of May and the depth of sowing should be from 1in. to 1¼in. Baroota Wonder, Red Russian, and Lotts might be the most suitable varieties to sow. The swampy patches noticeable through the district would disappear after a heavy dressing of lime. In answer to a question, Mr. Spafford said that mallee shoots were always most difficult to kill where the rainfall was good. In drier areas they succumbed much more readily to fire. He was averse to cropping the sandy land if plenty of the stiffer clay flat lands were available.

FORSTER, October 21st.—A paper entitled, "Never buy what you can grow on your own farm," was read by Mr. James Searle, in which he urged that it was cheaper for a farmer to produce for himself than to pay others to produce for him.

Farmers should grow their own fruit and vegetables. Calves should not be killed, but should be kept until two or three years old, when they supplied beef. Poultry should also be raised on the farm to supply eggs and food.—Mr. C. Payne advocated the conservation of fodder by cutting portion of the crop in the yellow stage and threshing or heading. The headed straw paid for the extra trouble, being two-thirds the value of hay. Mr. G. Evans considered that the rough state of the country was against binding, because stumps were high and crops frequently on the low side.

GERANIUM, November 4th.—Mr. F. Norton read a paper on bookkeeping on the farm, in which he pointed out that farmers would save themselves considerable time and trouble in their general business, and specially in compiling their taxation returns, if they kept books. He suggested keeping a diary for recording each day's work, the quantity of seed and super. sown, when sown, and under what conditions and also a record book in which to keep results, and any other information which might prove useful. For the financial part of the business a cash book, ledger, and petty cash book were necessary. The cash book should correspond with the bank pass book, and should show all money paid into or drawn from the bank. The ledger showed all the accounts, including the amounts expended on wages, repairs, cornsacks, &c., &c. The petty cash book would show the small amounts paid in cash. With these simple books a farmer could always determine what his position was.

MONARTO SOUTH, December 9th.—A paper by Mr. G. A. Hartmann was read on what area to sow to make farming pay. He maintained that 250 acres should be put under crop every year to make farming pay. In the mallee country, where the quality of the soil was poor, more wheat would require to be sown. If the crops averaged 9bush. or 10bush., which would be 830 bags, and the price of wheat 3s. 9d. per bushel, that would leave the farmer only 3s. per bushel, because carriage, commission, and bags amounted to between 9d. and 10d. per bushel. That left but a small balance of profit. Therefore, in the future, the area would require to be increased or more cattle, sheep, pigs, and poultry kept. In the discussion which ensued, the opinion was expressed that if good water could be secured in that district and more dairying and pig-raising carried on, the writer of the paper could be agreed with. As regards boring for water, many thought that it would be too expensive in that district owing to the hardness of the rock. One member said he would not object to the expense if he were assured of a supply, because then he would grow lucerne.

MORGAN, November 11th.—A paper was read by Mr. W. G. F. Plummer on the size of irrigation blocks, in which he contended that for a block to be used partly for fruit culture and partly for dairying and other purposes, 15 acres were ample. Of that area, 10 acres could be used for trees and five acres for raising fodder for cows, pigs, fowls, &c. A block of five acres which was planted with lucerne had maintained 22 head of milkers besides a number of young stock. In addition a small stack of lucerne hay had been provided.

## SOUTH AND HILLS DISTRICT.

### BLACKHEATH.

December 9th.—Present: 12 members and six visitors.

HARVESTING.—Discussing the work of harvesting in an interesting paper, Mr. H. G. Pym said that the most observant farmers would watch their crops from stage to stage until, in their opinion it was at its best and then lose no time in cutting and stooking it. Most of the hay nowadays, was cut with the binder, which was the most economical method of dealing with it. The clipper was also extensively used in rough ground, where a binder could not be worked with advantage. Loose hay was preferable for feeding long, although the extra work involved in raking, cocking, and carting it on a windy day was a strong argument for the binder. As regards the best time to cut hay there was considerable difference of opinion. Oaten hay required to be left a while longer than wheaten before cutting. If left until it commenced to turn brown it would be about right. If cut before that it would have a bitter taste, and stock would not eat it too readily. The hay having been cut required to be carted and stacked. Loose hay could be carted within a few days of cutting, and sheaves in about 12 or 14 days, if the weather had been suitable. The farmer often had to face the difficulty of having hay ready to cart and wheat ripe enough to strip. In that case he would attend at once to the stripping, because the crop involved the greater risk. Hay properly stooked would withstand much rain and storms without great damage. To gather in the grain there were several different methods. In hilly or sandy country the most convenient method of dealing with the wheat crop was by means of the stripper and winnower. It was also an advantage to clean up behind the stripper, if sufficient labor were procurable, because by that means the loss often caused through heaping on a loose floor, or by heavy rain, would be minimised. Where the country was suitable the complete harvester had an advantage over the stripper and winnower, because everything was done in the one operation, thus doing away with extra hands, which were not easily procured under present conditions. It should be the object of every farmer to produce a sample of wheat for market better than his neighbor, and not be satisfied with anything so long as the bags were full, because, in the long run that system would not pay. Mr. J. Pym raised the question whether it was better to hire labor and clean the wheat up at once or put it in heaps. Members generally favored the latter view. Mr. H. Paech suggested putting chaff under the wheat heaps to protect them from the damp ground.

## CYGNET RIVER.

December 7th.—Present: 10 members and 20 visitors.

**Crop Exhibits.**—No paper was read at the meeting, but the members exhibited samples of their crops and related the conditions under which they were grown. Mr. H. T. Noske exhibited three samples of Prior malting barley. No. 1 sample was 6in. higher than No. 2 although sown on the same day, and both received 1cwt. of super. per acre. Both samples were sown on land which had been ploughed twice, but No. 1 had been cultivated just before sowing with a spring-tooth cultivator, to which was attributed the extra growth. No. 1 would, it was estimated, yield 10 bags per acre, and No. 2 only 8, so that from this it would pay handsomely to cultivate just before drilling. No. 3 had been sown on land which had been ploughed twice. It was fully three parts smut, and would, it was estimated, yield only two or three bags per acre. Mr. C. T. Miller exhibited a sample of Prior barley, sown on August 28, with 1cwt. of guano super. on heavy yellow clay land, which had been ploughed twice and then cultivated. The harrows followed every operation, and the resultant crop was estimated to yield 10 bags to the acre. On land which had been ploughed twice, but not cultivated, the grass and rubbish almost choked the crop. Experiments with mineral super., bone super., and guano super., taking into consideration the cost of the super., and the returns from each plot, were in favor of guano super. Mr. R. Loader showed a splendid sample of Russian rye, which, he said, should be sown very thinly, or otherwise it would not yield a payable crop. Sown thinly it yielded heavily, and as it carried a lot of straw, it was suitable for those who wanted a good burn off after the harvest to destroy the shoots. Some really good samples of Cape or six-row barley, planted under similar conditions to the malting varieties, were also shown. Mr. F. J. Wakelin exhibited some red beet, carrots, and swedes. There was also a good display of cabbages and onions.

## INMAN VALLEY (Average annual rainfall, 26in. to 27in.).

December 7th.—Present: 10 members.

**Sheep for Profit.**—Discussing the breeding of sheep, Mr. H. T. Martin, in an interesting paper, advocated breeding in numbers somewhat under the land's carrying capacity, the Lincoln-Merino cross ewe, or the comeback to the Merino or Lincoln. Each of the three classes was eagerly sought after, and commanded the highest rates from buyers in fat lamb producing districts, either as weaners or breeders. That month flock ewes had realised £2 2s. 6d. per head, and first-cross two-tooths 35s., which was quite 7s. more than butcher's value. Fat values were not proportionately equal to store values, therefore he recommended catering for the store market. There were always buyers for the right sort of stores in the paddocks, without paying rail fares, market dues, and untrucking charges, and very often without commission. If the right sheep were bred, good buyers would soon find them out, without paying an intermediary 1s. 6d. or 2s. per head. Ewes and lambs should be of the very best wool-producing strains. Rams of mutton breeds should not be used on ewes that were to produce ewes for future breeding. Wool realised 1s. 6d. per lb., whilst the carcass sold for 6d. per lb. The carcass was sold once, but a sheep yielded several clips of wool. Ewe lambs should be held until two-tooth, if there were room, without robbing the breeding ewes. That year he had sold his too tooth wethers off the shears, at 28s. 6d. each, and he baled 9lbs. of wool from each of them. Nearly half of them were Christmas lambs, only 10 months old. He could have got 35s. each for the ewes. The return from an average ewe at the present time at a low estimate of weight and price of wool was as follows:—Average wool (8lbs., at 1s. 6d.), 12s.; lamb (4lbs. wool at 10d.), 3s. 4d.; hoggets, wool (9lbs. at 1s. 6d.), 13s. 6d.; sale of hogget (average E. and W.), 30s.; total, £2 18s. 10d. He had accounted for two clips of the lamb, but one was for a lamb with only four or five months' growth. He deducted that amount, 3s. 4d., for the 12 months' expenditure per ewe, which left the handsome profit of £2 15s. 6d. per ewe, and the ewe still left to breed again. He was not absolutely opposed to dealing, because it was beneficial as a stock education, and kept one in touch with values, but the dealing should be done with the surplus grass. He did not advocate the production of fat lambs, because farmers did not cultivate fodder sufficiently, and the hard root grass, which was so plentiful in that district, was more suitable for raising store sheep. To produce prime lambs, without cultivation in that district it would be necessary to stock very lightly in order that there might be sufficient clover and soft grasses to force them on, but then the long, coarse and rough grasses would be wasted.

## MEADOWS SOUTH (Average annual rainfall, 35.52in.).

October 11th.—Present: eight members and one visitor.

Cultivation of Rape.—Giving his experiences in the cultivation of rape, Mr. W. Nicolle, in an interesting paper, said that land for rape should be ploughed in summer or early in autumn and worked down finely before the seed was planted. On March 10th, 1915, he drilled one paddock of 4½ acres of good land with a third crop (rape following peas and oats). He sowed 9lbs. of rape, 2lbs. of mustard, and 1cwt. of bone super. to the acre. The seed was well mixed with the manure, and drilled. The drill was worked shallow, and the rubbers on the drill were taken out of their right position and tied back, a light cord being stretched across the drill, and the rubbers fastened to it in order to allow the seed and manure to drop behind the drill to avoid going too deeply, and to scatter the seed more effectively. If it were calm weather when drilling, the rubbers could be taken off the drill, and the seed and manure could drop direct from the drill. After drilling it should be harrowed and rolled. To that paddock about 20 or 25 acres of grazing land were attached in order that sheep might graze on it, as well as on the rape. Another paddock of 12½ acres was sown on March 18th, 1915, but the land was poor. It was a second crop (rape following a crop of peas). That paddock was worked and drilled in the same manner as the above-mentioned paddock, with the addition of 40lbs. of oats to the aere, the oats not being mixed with the manure. To that paddock about 15 acres of grazing land were attached for sheep to graze on, as well as the rape. That was necessary in order to obtain the best results from the crops sown. The crops grew very quickly. On May 26th, 100 sheep were put on the 4½ acre paddock, and on June 4th 50 sheep were put on the 12½ acre paddock. The sheep did remarkably well. On July 26th 30 fats were sold, and on August 3rd 96 more were disposed of in prime condition, leaving 24 on the rape. Those were also sold fat, with the addition of 9 others which were put with them on August 5th. On August 25th 71 ewes and 70 large lambs were put on the rye, and remained there until October 7th. They were then taken off and the rape paddocks rested until November 1st. The rape ran to seed, but the sheep ate it readily and did well. On November 3rd 51 fat lambs were sold, and on December 14th 71 prime ewes and 19 lambs—those ewes and lambs did not derive as much benefit from the rape as the previously-mentioned sheep did. On November 1st 124 sheep were put on the 4½ acre paddock, and 30 on the 12½ acre paddock. On November 16th 124 sheep were shifted on to the 12½ acres and 30 on to the 4½ acre paddock, and left there until November 24th, when they were removed and a fresh lot of 26 ewes and lambs put on. The cultivation paddocks were almost done by that time, but a little feed was got through the summer and autumn, until the land was cultivated again in the ensuing season. For the six months 454 sheep were grazed at different times, without counting the last-mentioned lot of 26 ewes and lambs. Discussion ensued, and members generally stated that they had not been able to make a success of growing rape. It was a difficult matter to secure a good plant.

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## MEADOWS SOUTH (Average annual rainfall, 35.52in.).

December 6th.—Present: nine members and one visitor.

Pruning Fruit Trees and Other Orchard Work.—Pruning required to be done when the tree was young, remarked Mr. G. T. Griggs, in a paper on pruning fruit trees and other orchard work. It was necessary, he continued, to cut the tree back, in order to develop sufficient strength in the stem and branches to sustain the weight of fruit as it grew. The tree should be evenly balanced. There should only be three or four branches to begin with, the tree being kept open, and the young shoots, where too thick, cut out. Some of them might be cut back to form fruit spurs, an operation which could be performed during the summer. If the trees were permitted to develop for 10 or 20 years, and then large limbs were removed, the trees would probably be ruined. If the wounds so made did not heal up, dry rot would ensue. By checking the growth the fruit was formed on the strong branches, and the effects of the wind were minimised. Nearly all fruit trees needed to be cut back, and the limbs of the fig tree needed cutting back, with the result that several branches would grow out of the ones cut off. By cutting back some limbs of cherry trees, fruit buds were forced out on the lower part of the branch, and by cutting back the outside limbs of old plum trees new shoots were forced out farther back, and that was where the best of the young wood was secured the following season. With regard to manure, he preferred gypsum. He placed it around the trees and scattered it about. It improved the quality of the fruit and the growth of the trees. When pruning or grafting old trees, sufficient small wood should be left to keep the sun from burning the bark on any of the branches. If the sap were not sufficiently fast in its flow, the sun would burn the bark, and it would die on the upper side. To avoid that, he had tied bagging over it to protect it until the foliage came. All weeds should be kept down, and some sheep might be kept in the orchard, to assist in repelling codlin moth; the sheep, however, would destroy the low branches, and the fruit returns would be impaired. In storing fruit, more especially apples, if an excavation were made in a hillside, and the fruit covered and kept dry, the result would be satisfactory. A Jonathan apple had been found in November which had been ploughed under the furrows. It was quite sound and crisp. In reply to questions, Mr. Griggs said that fruit would keep best in a cool, dry place, not exposed to the wind. He demonstrated the method of budding, and said that he preferred it to grafting. He advocated the use of lime, because it made the soil more friable.

## MILANG.

November 11th.—Present: 33 members.

Pigs.—After dealing with the history of the animal, Mr. William Saltmarsh, in a paper on pigs, recommended first that they should be fed, when growing, three times per day, unless running in good green feed or stubbles, when, in the latter case, good slops should be provided, and in the former case, some corn. If provided with good food and a good dry bed, they would sleep all night and be ready to forage all day, and mature rapidly if required for bacon. If, on the other hand, the object was pork, a different plan should be adopted. The animals should be weaned at six or seven weeks, put straight into the fatteining pens, and fed liberally on the best feed obtainable. If there was an engine on the farm, there should certainly be a crusher also, and all corn should be thoroughly crushed, and in the case of feeding to young pigs, should be thoroughly soaked in milk. Wheat was undoubtedly the best grain, and the finer it was ground the better it would be, being easier of assimilation than whole or roughly crushed corn. Peas, barley, oats, and rye were all valuable, and might be given for variety. Where corn was not grown, pollard, when of reasonable price, could be used to advantage. He did not recommend any particular breed. His experience as a breeder had been confined to Berkshires, and he was satisfied with it as an all-round animal; but whatever breed was adopted, a pure hog should be secured. Berkshires were represented all over the State, and would therefore be easier to keep up to the standard than any other breed. In choosing a sow to breed from the teats should be examined. The more she had the better. A young sow might be bred from. It had been proved that a sow put to the hog at five months old had been highly productive up to seven or eight years of age, starting with a litter of eight, and at maturity producing 14 pigs, and her growth at the same time had not been interfered with. Under a starvation diet, advocated by some breeders, the sow would be stunted in growth. Sows should be allowed plenty of exercise, and small pig-proof enclosures a few acres in extent should be provided, some of which should be cultivated and sown with mangolds, Cape barley, &c., and one with lucerne as a permanent pasture. Some days before a sow was due to farrow, a pen should be provided, with short straw for bedding. The straw was essential, because the sow would commence making a bed sometimes a week before farrowing, and would pull it down and make it up again a number of times. All sows should be booked at time of hog service, and a note made of the time of farrowing. If that were neglected pig-breeding might as well be abandoned. The sow should be fairly fat when she farrowed, because, no matter how well fed, a good milker would lose flesh rapidly when raising a litter. Young pigs should be encouraged to drink early by providing a trough or dish which they could get at easily. That would teach the young to forage for themselves, and relieve the sow of the continuous drain on her system. Young pigs which commenced to feed early could be weaned at six weeks; otherwise they should be left on the sow a couple of weeks longer. The practice of weaning at four weeks was to be deprecated, because it impeded development and sometimes ruined the animals entirely. Where water was abundant, a bath should be constructed in some convenient and shady spot. Concrete, with cement facing, would make a fairly cheap bathing hole. The excavation should be about 16in. deep, with sloping sides. That could be easily flushed out whenever cleaning was necessary.

## PORT ELLIOT (Average annual rainfall, 20.33in.).

October 21st.—Present: five members.

**Does Manuring Fruit Trees Pay?**—In a paper which put that question Mr. W. E. Hargraves arrived at an emphatically affirmative conclusion, as the result, he said, of three years' experimenting. He had been asked by the Branch to undertake the task and make a report. The trials were made on four trees of each of the following kinds of apples:—Jonathans, Winter Permains, Cleopatra, Dunn's Seedling, Lord Nelson, Red Aberdeen, Irish Peach, Garibaldi, Emperor Alexandra, Rome Beauty, Rokewood, and Strawberry Pippin. He also treated five pears and plums. One of each variety was left without any manure. The difference was very marked in those which had manure; not in every case with regard to numbers, but the quality and size of fruit on the manured trees were very marked. From the unmanured trees, it required, on an average, 200 to 220 to fill a bushel box, but the average of those from the manured trees was about 130. The best time to use stable manure was in June, when it should be spread round the trees and then ploughed in about July. Bonedust and superphosphate should be placed around the trees a week or two later, and dug or hoed in. The best of all manures was blood from the slaughterhouse. For the first five trees (one not manured) he dug three holes about 1ft. deep at equal distances apart, about 3ft. from the trunks, and put about a gallon of blood in each hole, and filled up with soil. All weeds were kept down. In the second year, the same five trees had ½lb. of mineral and ½lb. of guano super. each. In the third year the same trees had a barrow load of peat and a few shovelfuls of lime and wood ashes. In the second lot of five trees (one not manured) the first year a wheelbarrow full of stable manure (made with seaweed for bedding) was dug down, and a few weeks later a few handfuls of salt sprinkled around the roots, and was washed into the soil by the rain. The second year those trees had 1lb. of potash and a few shovelfuls of fowl manure, and in the third year a wheelbarrow load of peat marl and goose manure mixed and dug in around each tree. In the third lot of five trees (one not manured) for the first year two barrow loads of seaweed were spread around the trees and left for some time, then ploughed in, and a few weeks later 1lb. of guano super. was sprinkled on top and hoed in. The second year ½lb. of potash with goose manure and wood ashes were applied, and in the third year stable manure and lime were ploughed in and 1lb. of mineral super. hoed in around each tree. In the fourth lot of five trees (one not manured) for the first year one bag of sheep manure and a few shovelfuls of lime were supplied to each tree. For the second year a few shovelfuls of sheep manure mixed with blood and a few weeks later ½lb. of potash were supplied. For the third year a wheelbarrowful of peat and goose manure and ½lb. of mineral super. were used. In the fifth lot of five trees (one not manured) for the first year stable manure made from pea straw which had been used as bedding and a few shovelfuls of lime were applied. For the second year seaweed was laid around the trees for a few months in the summer time, then raked into heaps and burned and the ashes mixed with a few shovelfuls of fowls' manure and spread around the trees. For the third year sheeps' trotters were put down about 3ft. from the trunks of the trees and 18in. deep with 1lb. of bonedust and ½lb. mineral super. per tree. Bonedust was one of the best manures, only it was not so quick in action as other manures, but was more lasting. He had tried many ways and many manures. For larger or better fruit and more of it, it was best to change manures each year. If stable manure was applied one year superphosphate or bonedust should be used the next and then followed with ashes, lime, seaweed, and peat. It would not only pay twice over, but it was very interesting to observe the results. Manure did not compensate for the neglect of cultivation. Manure made weeds grow, and if permitted to flourish they would rob the trees of moisture, etc. The more manure was used the more was it necessary to cultivate the orchard. For the last two years he had been experimenting on two trees, viz.:—No. 1—First year, bag of sheep manure and two shovelfuls of soot; second year, 4galls. blood and a month later 1lb. mineral super. and ½lb. potash. From that tree, in the first year, he gathered 4¾bush. of mixed sized apples, and last year 13½bush. of good apples and a few small ones, besides windfalls. No. 2—First year, bag of sheep manure and a few shovelfuls of lime; second year, 1lb. potash, ½lb. guano super., and ½lb. mineral super. That tree yielded 10¼bush. in two years, against No. 1 tree 18¼bush., showing 8bush. in favor of blood manure, which in the two years, at 2s. 6d. per bushel, amounted to £1 on the No. 1 tree. Most of the dressings, such as mineral super., bonedust, ashes, lime, fowl and goose manure, seaweed (both fresh or burnt), soot, marl, &c., would show a profit of 50 per cent. over unmanured trees. But blood manure, stable manure, sheep and cattle dung and peat mixed with potash would show a profit of 80 per cent. to 90 per cent. The fruit was larger and of better flavor, and worth 1s. per bushel more than the produce of unmanured trees. And the trees grew strong and healthy by using sufficient manure. The manure should be put on in early winter, and the land should be cultivated to keep the moisture in the soil. Seaweed burned and the ashes spread around the trees seemed to act like potash. He intended to use it in the place of potash, which was very expensive, and difficult to obtain since the war. We are told that science has been defined as knowledge of natural laws derived from a knowledge of facts. If it is so or not I am not going to say, but I do say manuring fruit trees in a scientific way is a knowledge that no fruitgrower should be without. He was sure that they could feed their trees and make them produce 100 per cent. more fruit, and he was not going to stop experimenting until he could tell the Branch that he had done so. If it had not been for the dry seasons in the past, he would have been able to have done so that day. He was experimenting on a few trees in what he called subsoil manuring, and would report next year. His method was to make a few holes about 18in. from the tree, with a crowbar, about 18in. deep. He then put about 4in. of sand into the holes, and filled up 6in. or 7in. more with bonedust or super., covering that with sand or dirt. That should enrich the subsoil and cause the tree roots to go down into the clay, thus enabling the tree to stand the dry weather better.

## STRATHALBYN (Average annual rainfall, 19.28in.).

December 5th.—Present: 22 members.

Dairying.—Suitable country for dairying should be capable of growing an abundance of maize, sorghum, &c., observed Mr. A. Burgess in a paper on dairying, or else, he continued, in a locality where irrigation could be carried to lucerne plots to ensure a supply of green feed all the year round. That was essential to heavy milking and to keep the cows in good health. An ideal spot for growing maize and sorghum was where there was an overflow from a creek or river each year. That was much better than irrigation by means either of engines or windmills. In the selection of cows there were several points to be considered, different localities suiting different breeds. A good cow should have plenty of udder room, a nice square udder with large milk veins, thin neck and tail, and be straight along the back, wide between the eyes, and of good temper. Her milk should test at least 4 per cent. of butter fat on an average milking, and measure over 3galls. per day for butter-making. If milk were the objective the deepest milkers, so long as they yielded milk testing over 3.2 per cent., were recommended. He preferred the Holstein-Jersey cross, the Holstein being a heavy milker, and the Jersey yielding milk very rich in butter fat. Another good cross was the Shorthorn-Ayrshire. Those calves were better for fattening for market than the Holstein-Jersey cross. Bulls for stud purposes should be pure-bred, and from a heavy milking strain on both sides. The farmer should breed his own heifers. By so doing he was able to sell some of his older cows each year and still keep up the herd by selecting the best. The Babcock milk tester was the surest way to ascertain the quality of the milk yield. The cowshed should be paved with bricks and given a thin wash of cement. It should have a drain at the rear of the bail, and a cemented pit at the end of the shed for all refuse. The shed should be hosed out daily, and have a slight sprinkling of lime dusted over, to ensure cleanliness. Milk would more quickly absorb an odor than any other liquid. At milking time the cows should be quietly handled. An excited cow would not give her milk freely. Fast milkers were preferable. Care should be taken to strip the cows properly, because the last of the milk contained most of the cream. The milk should be kept as nearly as possible at the same temperature as when taken from the cow until it was separated. Then the cream should be cooled off. On no account should it be mixed with the staler cream while warm. The mixing should be done thoroughly. For churning, the cream should be ripe, and not above a temperature of 62deg. When, in the course of churning, it began to break into lumps about the size of large shot, the buttermilk should be drawn off and brine put in the churn, which should then be turned for another five minutes. The butter would then be ready to put through the worker. The salt should be sifted and mixed while the butter was being worked and washed, half an ounce of salt being allowed for every pound of butter. The separator and dairy utensils should be scalded immediately after use, a little soda also being used. The separator room and dairy should have cement floors. Separator milk, when cool, mixed with a small quantity of pollard, made an excellent pig food. Calves, if fed in the same way, would fatten very quickly, and would not scour as they did on separator milk alone. Before feeding, the froth should be skimmed off the top of the milk.

Lucerne-Growing and Irrigation.—Mr. Frank Abbott read a paper on lucerne-growing and irrigation. He recommended sowing 12lbs. to 14lbs. of seed to the acre. The seed should be harrowed in, and then rolled. The ground should be kept in fallow for 12 months before sowing to kill all weeds. A tank stand 15ft. in height, should be erected to carry a tank, from which the pressure of water would ensure a good sprinkle.

## WOODSIDE (Average annual rainfall, 31.95in.).

November 8th.—Present: six members.

Ensilage.—Ensilage, said Mr. John Hutchens in a paper on that subject, was not only good for cattle, but was a sure preventive against dry bible. Any crop or grass which stock would eat in its green state, they would also eat readily as ensilage. The dandelion made excellent ensilage, and could be made in wet weather when it was impossible to make hay. If early crops were sown ensilage could be made before the hay harvest commenced, and the land could be ploughed ready for another crop, such as maize or sorghum, or as fallow for next year. He had just put two acres of barley in a pit, and had ploughed the land again ready for another crop. All crops cut for ensilage should be as nearly full grown as possible without being in any way dry. If cut too soon the sap was pressed out, and if too dry there was not sufficient sap to keep the temperature down. Ensilage should be carted as soon as possible after being cut, and making continued until the pit stack was completed, when the weights should be applied. He used about two tons of weights in a pit 9 x 9. Usually he got sweet ensilage on top of the pit and sour at the bottom. There was no more labor in making a ton of ensilage than a ton of hay, except the weighting, and the extra labor would be repaid in the better health of the cows and the reduction of the bran bill, because cows required either bran or green feed to keep them in health, and there was nothing better or cheaper than ensilage.

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HARTLEY, November 8th.—Mr. H. Cross propounded the question, "Does the small farmer try to grow too much wheat?" He answered it in the affirmative. A farm of 100 acres, to grow wheat, would require six horses and a quantity of up-to-date machinery, as much practically as on a large farm. If instead of wheat growing, dairying were carried on, only three horses would be required and very little machinery. After a small farmer had paid for the upkeep of his horses, machinery, and cornsacks very little was left. If six cows were kept, a couple of breeding sows, and about 200 head of poultry, the results should be satisfactory. Every farmer should have a small plot of lucerne, which the cows, pigs, and poultry thrived on. Thorough attention should be paid to these classes of stock to derive the most profitable results from them. Discussion ensued in which it was conceded that produce grown on a small farm showed the most profit if fed to stock. The suggestion that the crop should be harvested by contract was met with the answer that it was difficult to get the work done at the most suitable time.

KANMANTOO, December 9th.—Mr. W. C. Mills read a paper on lambing ewes and the poisoning of foxes. He said that oats were the best milk producers. They were easily grown, and were little trouble to feed to ewes whilst lambing. Discussion ensued, in which the opinion was general that from the middle to the end of April was the best time for lambing in that district, provided that there was a good supply of fodder for the ewes prior to lambing.

MOUNT BARKER, November 3rd.—Members of the Murray Bridge and Mypolonga Branches paid a visit to the Mount Barker Branch, and were entertained at lunch and afternoon tea. The local tannery, Messrs. Pope Bros'. farm, Mr. L. Cowan's property at Blakiston were visited, and other crops were inspected en route. A most profitable and enjoyable day was spent, and the Mount Barker Branch was invited to pay a return visit in March next.

PORT ELLIOT, November 18th.—Mr. Hamilton Welch delivered an address on dipping sheep, recommending that the dipping should take place about a week after shearing. The sheep should be carefully mustered, especially in scrub paddocks, and, if necessary, a second dip should be given. Cool weather should be selected for dipping, and the sheep should not be thirsty, especially if the weather were warm, in order to avoid any risk of the animals drinking the dip mixture. The directions on the packets of dip mixture should be carefully followed, and there should be plenty of water in the dip to ensure that each sheep could be easily immersed. After dipping, the sheep should be placed in pens with concrete floors inclined towards the dip in order that the drippings might run back. The sheep should be kept in the pens until fairly dry, because the drippings would poison grass. Sheep should be examined for tick every three months.

## SOUTH-EAST DISTRICT.

### GLENCOE (Average annual rainfall, 33.84in.).

November 6th.—Present: eight members and two visitors.

**Increasing Soil Production.**—"Are our farms as productive and profitable as they should be?" was the theme of a paper by Mr. T. F. Gratwick, who urged that if the land were held in tenancy, on the same terms which prevailed in England, namely, an annual rental on the value of the farm, where, if land were worth £30 per acre, the rental would be 30s. per acre, then they would realise that the cash returns from their lands were not as high as they should be. If a farmer in that district could not pay 30s. per acre rental and make a profit, then either the value put on the land was too high, or the land was not farmed as well as it should be. The rent of 30s. per acre, compared with rentals paid in other countries and even in other parts of the Commonwealth, was not high. In the Western District of Victoria up to £4 per acre was paid, but they had better markets, and possibly their land was superior. In England, where much of the land was mountainous, 30,000,000 sheep were maintained. It seemed as if there was something to learn in that line. The statement was frequently made in that district that the land was becoming exhausted; but last year 400,000 acres were under crop for potatoes in England and Wales, and the yield averaged 7 tons per acre. In those countries potatoes had been grown for several hundred years, and the yield per acre was three times as great as in Glencoe, an indication that the fault in that district was rather with the farmer than the farm. If properly treated, land could not be exhausted, and the decreasing yields in Glencoe indicated that there was something wrong with their methods. The yield and quality could be improved if more care were exercised in the selection and keeping of seed, a proper system of rotation of crops adopted, and, lastly, the crops were properly manured. Manuring was a matter for experiment, and should be undertaken by the Agricultural Department, though individuals might do something in a small way. Good results had been obtained from peat soils by the application of super. when the potatoes were planted, but in Glencoe he doubted if that system would succeed, because the potato, finding an abundance of plant food immediately surrounding the set, had no necessity to develop an extended root system, and made very rapid growth for the first few weeks; but when the dry spell, which occurred every summer, arrived, the plant displayed fewer drought-resisting qualities than the unmanured crop, because of its cramped root system. If the root system had been developed in search of plant food, as in the unmanured crop, it would also have obtained additional moisture from the same source. The result was that the crop without manure gave a better yield than that which had been manured. In the peat swamp, there was usually a sufficiency of moisture and lime, and hence the satisfactory results from the use of super. Without having made any experiments, he was of opinion that it would be profitable to drill bonedust, blood manure, or super. on the fallow and work it well into the soil some time before the crop was planted. That would promote the extension of a good root system in search of the plant food scattered through the soil, and would ensure a steady development throughout the whole growing period. The succeeding grain crop would also derive some benefit from the fertiliser not absorbed by the potatoes. To secure the full benefit from manures, they should be combined with deep and thorough methods of cultivation. Experiments by the Victorian Agricultural Department demonstrated beyond doubt the benefits derived from the use of immature seed. The use of manures also returned a profit, in some cases considerably in excess of the cost of the manure. In regard to general farming, he quite agreed with the opinion that there were too many weeds on their grass paddocks. There was too much sorrel, Cape weed, thistles, and silver grass, and insufficient English grasses and clovers. The easiest way to improve the pastures was to use more artificial manure with the grain crops, which would result in heavier yields of both grain and grass. There should be a small paddock of lucerne on very farm. With the improvement of the soil, the stock would also improve.—Mr. A. Dow said that the dry summers of the past few years were responsible for the low yield of potatoes. England's big potato yields were the outcome of the application of large quantities of farmyard manure, in addition to artificial fertilisers. Mr. A. Murray said that farmers on the higher-class land near Melbourne, by intensive cultivation, carried more stock than in that district. Mr. J. Dow said that he had tried manuring potatoes, but without success. He had found it impossible to establish lucerne without a heavy dressing of farmyard manure, except on new land. Mr. L. Flett said that weeds were the worst evil to contend with in establishing lucerne. Mr. W. Noolan, jun., said that in the latter district farmers used a single-furrow disc plough and tore up the land as much as possible, and although the soil was of light sandy nature, lucerne grew well. Mr. J. T. Halliday would plough the land three times in preparation for lucerne, and sow the seed in September, using ½bush. of barley and ½bush.

of oats as a cover crop, and then broadcast the lucerne, using a bush harrow afterwards. A good wind would cover the seed sufficiently without harrowing. Lucerne was a deep-rooted subsoil feeder, and therefore did not impoverish the surface soil.

## KONGORONG.

December 5th.—Present: 11 members.

How to Grow Grain Crops Successfully.—In a paper dealing with the successful growing of grain crops and the method of disposing of them when grown Mr. Ernest Adams said that the first essential for good crops was clean land. A third portion of the arable land should be fallowed each year. The land should be ploughed, when wet, to a depth of 5in. or 6in. The disc harrows or springtooth cultivator should be used in hot weather before the seeding of the weeds. Before cropping commenced the land should be ploughed lightly and harrowed. The most profitable grain crops were oats and barley, but the best profit was obtained by crushing the grain and feeding it to pigs. Ten bushels of crushed grain put more flesh on pigs than 15bush. of whole grain. Pigs, to be profitable, should be ready for market at six months. They required a warm, dry place to sleep in. Oats should be cut very green, and they could be cut with a grass mower if necessary. The oat hay should be fed to cows when the grass had gone off, which would be more profitable than growing hay for chaff or growing oats to sell the grain. Mr. W. A. Aslin said that it was profitable to purchase stock in winter and improve or fatten them when other people had not the feed. He was averse to deep ploughing, because it raised too much of the poor subsoil to the surface. Pigs fed on whole barley did well if the grain were scattered on the ground. Mr. C. Kemp said that his stock ate loose hay, and did not leave a straw. Mr. C. T. Atkin preferred green hay, loose, but the cows would eat hay cut ripe and scattered. Mr. F. R. Uphill preferred oats to barley for feed. Mangolds should not be fed to pigs unless cooked, as it was liable to cause their death. Mr. F. Kemp said that pease were the best food for pigs. Mr. W. A. Aslin said that the trouble was to harvest the pease. Mr. E. G. Morrison said that pease, if sown with oats, would stand up to be cut with a grass mower. Mr. C. S. Atkin said that there was an attachment which could be applied to mowers to cut pease.

Tagasaste Hedge.—Mr. C. Kemp, in a paper on tagasaste, or, as it was commonly called, tree lucerne, said that it was a very quick grower, and when once it was well started was very hardy, and kept green all the year round. He dug a trench 3ft. wide, on the weather side of a field of oats, and planted tagasaste seed, after he had scalded it well to assist germination. The oats crop sheltered the young plants which grew with the crop. In 12 months the hedge was higher than the fence, and it had been a simple matter to keep the hedge trimmed with a pair of shears. At the same time as he planted the seeds, he also put in some strong healthy plants, but they had not thrived nor grown as well as the seeds. By planting very thinly and trimming from the bottom, a very shady tree was obtained. Stock readily ate tagasaste, and therefore it should not be planted where they could reach it. During the drought, those who had tagasaste found it a splendid fodder. Mr. T. Dixon said that it was best to sow tagasaste in two rows about 6in. apart. Mr. C. T. Atkin said he preferred to sow seed, but he had done well with plants. He was averse to a thick hedge for either vegetable or fruit garden. Mr. A. C. Gust said that, in his experience hedges should always be grown from seed. Members generally agreed that it would be profitable to plant waste or poor lands with tagasaste as a shelter and standby for feed.

## NARACOORTE (Average annual rainfall, 22.60in.).

September 9th.—Present: 21 members.

Laying out, Care, and Supervision of Experimental Plots.—A paper was read by Mr. E. S. Alcock (Inspector of South-Eastern Experimental Plots) on the above subject. He laid special emphasis on the necessity for care and accuracy in all work associated with the experimental agriculture, and suggested that where time was limited on the farm, rotation tests should be conducted. Three or four varieties, such as wheat, peas, oats, mangolds, or potatoes could be tried; the oats being sown first and then wheat, followed by the peas, and the potatoes and mangolds being left for the spring. The cereals would, of course, be harvested at the usual time. As to manurial plots, half an acre would be sufficient, and it would not take up a large area to experiment with a number of manures. He favored long and narrow plots rather than square ones, as in the former they would be likely to get more land of the same character on an equal basis. Another point they had to keep in view was the depth of the ploughing for the various cereals experimented with. Manurial plots need not be fenced off separately, but in the case of rotation plots each would have to be fenced off separately. It was handy to have the plots near the homestead, as they were likely to receive more attention and be under more regular observation. In measuring plots, accuracy was essential to ensure correctness in respect to the ultimate results. They had to allow a certain amount for stock reaching over the fences. It was essential, he urged, to have the boundary fences wire netted to keep rabbits out, and to prevent stock from feeding inside. Another thing they had to contend with was wind, and therefore they had to plant trees for shelter, such as gums, wattles, pines, &c. The cultivation should be done carefully and thoroughly, particularly the ploughing and harrowing, and as far as could be arranged on one system. They should plan out the work before beginning, and do everything on system and method. Care should be taken at seeding time, and everything should be measured or weighed. They should arrange their drill carefully, and see that the super. and seed went through it properly and evenly. In the harvesting of the plots it was necessary to use the same care, and see that everything was weighed or measured and tabulated carefully as each operation was performed. He liked the strippers and winnowers for harvesting plots in preference to the harvester. With the harvester it was almost impossible to get the machine empty without considerable loss, unless they went to great trouble. The most complete way, however, of harvesting plots of cereals was by the binder and thresher. The latter was the plan adopted at Roseworthy and Kybybolite. By that means they were able to tabulate the results of grain and straw. Directly the produce was taken off they should mark each bag as it came off the machine, with raddle or pencil, so that the results could be readily seen. In connection with grazing plots they had also to be careful about tabulating the dates. They should keep records of the number of stock and the dates on which they were put on a field plot to graze and when taken off, and their condition, &c. In the case of sheep, they would work out the value of the wool yield per year, and thus they had a basis for obtaining the value of the grazing. In connection with plots it was very necessary to keep a diary, in which each day's work should be entered, and observation notes kept. That would be found useful in tabulating the results at the end of the season. In reply to questions, Mr. Alcock said that the variety of wheat which had proved the best at the Kybybolite Farm by experiments was Federation, and then came White Tuscan and White Essex. A wheat that had done very well, so far, was Queen Fan—a hybrid raised by Mr. Spafford, the Superintendent of Experimental Plots for the State. Other wheats had been experimented with with varied success. In connection with oats their results had not been so definite, as they had struck two or three bad years, and therefore he would not like to recommend any particular variety as yet for that part of the South-East as being more particularly suitable. Before they could draw any definite conclusions from results it was necessary to conduct the test for at least three or four years. A wheat that had stood out very well in plots was a variety named John Brown, but in the field it did not yield well. The oats that had done the best with them were Ruakura, Algerian, Tartar, and Sunrise. They were at present experimenting at Penola, Mount Gambier, and other places in the South-East with something like 14 varieties of barleys and oats that had been found good yielders in New Zealand. They required in the South-East some better yielding oats than they were accustomed to raise crops from. The Algerian was low in yielding, and they thought that by trying some of the good yielding New Zealand varieties they would strike something that would suit the South-East better as a yielder. In white oats it was necessary to sow heavily—4bush. to the acre—as they grew coarse and it was necessary to keep them down by feeding. The quantity was put in in one drilling. He would advise the sowing of the Algerian variety very early. He would not recommend sowing in August as a rule, and he believed sowing early and feeding off was safer. In reply to a question about the feeding off of cereal crops, he said there was one drawback in feeding off and that was that, as a rule, sheep did not touch the rank portions and confined themselves to the short stuff.

### NARACOORTE (Average annual rainfall, 22.60in.).

November 11th.—Present: 28 members.

District Grasses and their Relative Feeding Values.—Many of the grasses in that district were not indigenous, observed Mr. A. B. Feuerheerdt in a paper on grasses in the district and their relative feeding values, but had been introduced from various parts of the globe and become acclimatised, therefore he proposed to treat them in that paper as indigenous grasses, and would endeavor to give some information on their habits and relative feeding values. On their varied soils, ranging from heavy flats or plains, which became periodically inundated, to higher loamy lands and sandy ranges, were to be found a large variety of grasses, both indigenous and naturalised, growing under conditions which they each required, and many might be found growing upon wet and dry lands alike; in such cases they were grasses which had gradually become acclimatised to suit their varied conditions. The greatest variety of any one particular family of grasses was in the clovers and trefoils, there being something like 150 varieties; yet, strange to say, not one of them was indigenous to Australia, two only coming from America, and the remainder from Europe, and in that family were to be found varieties which would thrive in almost any conditions found in Australia. Clovers were not only most nutritious grasses, but also most valuable in increasing the fertility of the soil, through that peculiar faculty they possessed of collecting the nitrogen from the atmosphere and transmitting it to the soil. The small nitrogen nodules might be seen adhering to the roots of clovers, and so it was obvious that the heavier the crop of clover the more fertile did the soil become, and it should be their endeavor to increase the amount of clover growing in their pastures. No plant responded more rapidly to an application of superphosphate; it invigorated the plants, and in turn the production of nitrogen was increased and also the production of seed. That no clover existed before the land was treated by super. was a fallacy. It was simply the stimulating effect of the chemical manure which invigorated the small plants which were growing there in a stunted condition. He would strongly advise the cultivation of the clover family on either high or low country, loamy or sandy. It was particularly valuable to the farmer, for in collecting the nitrogen from the atmosphere, it stored the bacteria in such a form as to become available to all plant life. It had been estimated that ploughing under a three-ton crop of green clover returned to the soil 40lbs. of nitrogen, 8lbs. of phosphoric acid, and 34lbs. of potash per acre. The roots also added humus and made the soil more friable and opened it up, thus allowing for a freer passage of air. Therefore, besides being a soil builder, clover, either in the pasture or cured for hay, was a valuable feed for all classes of stock, and he had no hesitation in saying that where clover would thrive almost any other grass or cereal would thrive also. Among the numerous varieties he would confine his remarks to those which might be found growing in that district. *Trifolium procumbens* (yellow or hop clover) was best suited to sandy soils. *T. resupinatum* (strawberry clover), a good pasture plant, though somewhat small, thrived on both sandy and loamy soils not subject to inundation. *T. fragiferum* (perennial strawberry clover) adapted itself to much wetter conditions than the former. *T. hybridum* (alsike clover) best suited to swampy conditions or irrigation. *T. incarnatum*, one of the best for sowing on stubble land, came away early, and possessed good fattening properties. *T. medium*, red (zig zag, or Mount Schank clover) thrived best in calcareous soils that were not too wet. *T. ochroleucon* (pale yellow clover) required similar conditions to the former. *T. pratense* (red clover), one of the best for permanent pastures, preferring rich calcareous soils, well drained. *T. repens* (white clover, also called Dutch clover), valuable in the pasture, preferred moist soil, but would shoot out again on dry land after the first rain. *T. subterraneum*, a most valuable species, which would become more extensively grown as its qualifications became more generally known; it thrived equally well on clay or sandy soils, providing they were well drained; all stock would eat it greedily, and fortunately Nature had endowed it with one of her many wise provisions—that was, a peculiar faculty of burying its seed panicles, and thus preventing the plant from becoming entirely extinct. Burr clover, the last on the list, but perhaps the one which they were most familiar with, was found chiefly on stiff, heavy land which was not subject to inundation; a good fodder plant in its green stage, and through its prolific seeding propensities affording a considerable amount of food when dry. Unfortunately, owing to the tenacious formation of the seed pods, it clung to the fleeces, and so decreased the value of the wool; personally he would sooner lose 2d. per lb. on the wool than be without that clover in his fields. Closely allied to the clovers was the melilotus family, one of which best known was often called Californian lucerne. It was of poor feeding quality, and not worthy of cultivation in that district, yet the same plant on King Island, in Bass Strait, was claimed to have converted into a very reproductive country what was formerly considered to be almost worthless land. It was there known as King Island melilot. It was fibrous and bitter, but he was not adverse to seeing a little of it mixed with the hay crop, for it imparted a very pleasant odor to the hay. That closed the list of leguminous plants, and they should receive every encouragement to disseminate them through the fields and pastures. Perhaps their best indigenous general utility grass was one known as barley grass. Two species were found growing in that district; one growing upon the wet or plain country, and the other upon the banks or hills, the latter being somewhat coarser than the one found on the lower lying country. It was the first and earliest feed to start after the rain, and thrived particularly well if the land had been somewhat flooded, and its growth was not retarded by the most severe frosts. It was especially good for lambing ewes, and kept green well into the spring, when it ran up to seed. It had one slight drawback—that of setting up a certain amount of irritation where the dry seed sometimes lodged in the jaws of sheep and around the gums of horses. That variety found upon the high land was similar in habit and growth, but less succulent. Another of their earliest grasses was one commonly, but erroneously, called dandelion. It was an introduction from Cape Colony, and should be called Cape weed. It thrived equally well on all high ground. It started with the first rain, and died off with the first appearance of summer. On the whole it was an undesirable plant of poor feeding quality and suppressing grasses of more value. Horses grazing on sandy land were apt to become sanded through licking up the dry plants after they had died down. The true dandelion was an introduction from England, and two varieties were to be found growing in their pastures—one with rather a prostrate habit, preferring sandy soil, and was much inferior to its taller growing brother; they were both at their best during the spring and summer. They might be recognised by their yellow flowers. They belonged to the same family as the thistles, and had the same milky juice peculiar to that order of plants. Another of their earliest grasses was spear grass, or black prairie. That came up with the first rain and furnished an abundance of green feed until the warm weather arrived, when it died off. It was a very heavy seeder, and if cut at the right period it made very useful bush hay. That grass, however, would only thrive on high dry ground, and grew equally well on both loamy and sandy soils. The wild oat was also an introduction from Europe, and was the original parent from which all commercial oats had emanated. It was fair feed for sheep in its earlier stages, but it ran up and became stemmy, when it was best suited for horses and cattle. It was a valuable adjunct to pastures, but undesirable on cultivated land. Another grass, known as Bromley grass, was an indigenous plant, and in its habits somewhat similar to the wild oat, of comparatively little value until it ran up to seed in the spring, and was then relished by all stock. Wild geranium was not so abundant in their pastures as it should be. It was a very early feed, and grew upon a wide range of soils, and was famed for its fattening propensities. Wild carrot was another useful grass, similar in habit to the geranium, possessing good fattening qualities, and would grow in a wider range of soils and under wetter conditions. Canary grass, as the name implied, was an introduction from the Canary Islands, and it thrived on high and dry lands as well as the wet, moist flats; it was somewhat stemmy in habit, and was relished by all stock. Nut grass was an indigenous perennial; it came with the first rain and grew in low, close tufts, and died down with the first appearance of warm weather. It was easily recognised by its small, hard, nut-like bulbs found at the base of the stems, which increased each year, and from which the new growth started after the first rains. It was an undesirable plant, for where it was found growing other grasses failed to establish themselves. Probably one of the most valuable indigenous grasses was kangaroo grass; it was a perennial, and was found growing upon a wide range of soils. That grass was highly esteemed by the early pioneers, in whose time it was to be found growing abundantly, and horses became fat tethered while grazing upon it. It kept green through the hottest summer weather, but owing to the depredations of the rabbit, and evil of overstocking, it had become almost extinct. Sow thistles were to be found growing there in several varieties, and the one generally found in the kitchen garden was the best of the family. All stock were particularly fond of it, and it had a habit of starting into growth at all periods of the year. There was another species usually found growing in swampy localities. It was much coarser than the first named, and was somewhat spiny to the touch. Still more spiny was the Scotch thistle, and that plant might be classed as a very valuable addition to summer pastures. It was a biennial, the seedling plants running up to seed in their second year. The blossoms and buds of the plant contained much sugar, consequently it was very fattening, and was eagerly sought after by sheep, horses, and cattle. Besides the Scotch thistle possessing that qualification it was a great enricher of soils, having a long tap root. It derived its nourishment chiefly from the subsoil, and as it died off deposited it on the surface in the form of humus, and at the same time aerated the soil. There were many varieties of that plant, but the one described far excelled all the others. An annual belonging to the same family was known as the shore thistle, and might be recognised by its sage-green color, and its clusters of small pink blossoms. It thrived particularly well around rabbit warrens. It was of scant value as a pasture plant, although after the summer rains had fallen the dry plants were eaten by all stock, cattle being particularly fond of it. Hog weed, or wire grass, was also an introduced plant, and started into growth in the spring. It had a prostrate habit, and was somewhat fibrous, but being green through the summer was relished by all stock. Probably the best summer fattening plant on the plains was generally known as Mother Dutton, or Yankee thistle. It was an annual and thrived best on heavy moist soils, and should receive every encouragement to propagate itself in pastures. That could only be accomplished by light stocking or a periodical spelling in the spring. That also applied to all of the most valuable grasses, for it was only natural when stock had their choice they would seek out the best first, and only pay their attention to the others when the sweeter ones had been eaten out. That plant was also somewhat prostrate in habit until the summer set in, when it pushed out tall, slender stems upon which the seed was produced. There were many other grasses too numerous to mention, which were found growing in their pastures, most of which were insignificant, and of poor commercial value, but no doubt playing their own part in making the pasture as varied as possible. Upon the wet or swampy country were to be found grasses, herbs, rushes, and reeds all growing under the conditions suitable to each. Probably the best was what was known as cabbage grass. It belonged to the family *Tetragonis*, and might be recognised by its flat, succulent, shiny leaves, and its small white flowers; it was prostrate in growth, spreading its branches under and over the ground and rooting as it went along. It was a perennial, and was particularly good for weaners during the summer months. Stock grazing on that weed required very little water during that period. Australian millet, also known as white tussock grass, was also a perennial, and adapted itself to many conditions, wet and dry, from the hummocky sands of the coast to the heavy black flats and swamps. It was somewhat fibrous, and made better feed after being burnt off. It bore heavy seed, and was perhaps best suited to the grazing of horses and cattle. The same treatment also applied to the numerous reeds, rushes, cutting and thatch grass, they being all fibrous, but provided a large amount of rough fodder from the young growth after having been burnt off. On the swampy country of somewhat saline nature were to be found numerous herbages, two of which in particular were very succulent, and provided an abundance of fodder during the summer months. One, known as red weed, was a boon to the district during the period of the late drought. It was wonderfully prolific, and also fattening. In its earlier stages it had a purging effect upon stock, but not to an excessive degree, and that action upon stock at that period of the year no doubt accounted for them thriving whilst grazing upon the herb. The seed was very fine, and was carried about with the dust blown from off the swamps. The other plant, known as samphire, had somewhat the same effect upon stock, but was not nearly so nutritious as the former, and stock would not thrive if they were grazed entirely upon it. In conclusion he again advised the cultivation of the clover family, light stocking to encourage the seeding of the best grasses, and the frequent burning off of all low-lying country, that being the only sure method of destroying the numerous parasites and diseases which that class of country in particular was heir to. Mr. W. H. Smith said that he had a great opinion of subterranean clover, but they had not been told how to sow it. Mr. F. A. Holmes said that at one time melilotus did well on cultivated land on the plains. Mr. W. E. Rogers said that King Island clover gave them great trouble in the Millicent district, and stock would not eat it, because it was so hard in the stem. Mr. S. H. Shinckel said that stock took melilotus readily when in flower, but when dry it was somewhat woody. Mother Dutton grass had wonderful fattening qualities in February and March. Millet grass used to grow well in the South-East, but it appeared to have been eradicated. A number of clovers which used to flourish in the district had become extinct.

FRANCES, November 18th.—Discussion took place as to the best kind of wheat to grow in the district, and the consensus of opinion was that Federation was the best yielder and that Baroota Wonder occupied second position.

## BERSEEM.

Berseem is an excellent winter grower and a crop that makes headway when even oats and barley are dormant. As a greenfeed for poultry it is unexcelled, and all livestock take to it readily. It must be considered as a crop to be irrigated. Seed, which should be distributed at the rate of 20lbs. to 30lbs. per acre, should be sown in March, or at the latest during the first fortnight in April. It should be watered immediately to ensure prompt germination, and the first cut should be taken as soon as the growth is sufficient to permit of this. Subsequent cuts should be as frequent as possible, and in order to ensure best results, an irrigation should follow each cutting.

At seeding a dressing of superphosphate should be applied, and the addition of farmyard manure to the crop will do no harm. Seed can be obtained from the Department of Agriculture, the price being 10d. per lb. (cartage and railage extra).

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CLARENCE GOODE,

*Minister of Agriculture.*

# POINTS FOR PRODUCERS.

### Agricultural Bureau Conferences.

Arrangements are now being made for the 1917 Conferences of several of the Agricultural Bureau districts. The first to take place will be the gathering of representatives of the Upper Eyre's Peninsula Branches, at Cowell, on Tuesday, February 27th. Local arrangements, which are in the hands of the Elbow Hill Branch (of which Mr. H. J. Wheeler is hon. secretary), have been practically finalised.

This Conference will be followed by the Lower Northern Branches meeting, which is to take place at Lyndoch on Friday, March 2nd. In addition to the usual programme, the hon. secretary (Mr. J. S. Hammat) advises, the Lyndoch and Rosenthal Branches are conjointly undertaking the staging of a display of the products of the district.

The Middle Northern Branches will also meet in conference during the month, the date being Wednesday, March 7th. Local arrangements are being undertaken by Mr. R. J. Rose.

### Berseem.

Berseem is an excellent winter grower and a crop that makes headway when even oats and barley are dormant. As a greenfeed for poultry it is unexcelled, and all livestock take to it readily. It must be considered as a crop to be irrigated. Seed, which should be distributed at the rate of 20lbs. to 30lbs. per acre, should be sown in March, or at the latest during the first fortnight in April. It should be watered immediately to ensure prompt germination, and the first cut should be taken as soon as the growth is sufficient to permit of this. Subsequent cuts should be as frequent as possible, and in order to ensure best results, an irrigation should follow each cutting. At seeding a dressing of superphosphate should be applied, and the addition of farmyard manure to the crop will do no harm. Seed can be obtained from the Department of Agriculture, the price being 10d. per lb. (cartage and railage extra).

### Horses and Wheat.

The necessity for exercising the utmost care in keeping horses away from wheat has been frequently referred to, but despite these warnings, cases of wheat engorgement are reported from time to time. Prevention is cheaper and more effective than treatment. Where treatment is necessary, however, the Veterinary Lecturer recommends drenching the affected animals with ¼lb. of baking soda in a quart of warm milk; backraking, and giving the animals large enemas of warm soapy water. They should be encouraged to drink as much and often as they will, and they should be given no food until the wheat is passing freely. Plenty of brisk exercise will very materially help, and bleeding at the neck vein will likewise assist. Foundered feet should be soaked continually with either hot or cold water swab, the body and legs should be groomed well three times a day, and the distended flanks rubbed briskly at frequent intervals.

### Influence of Method of Thrashing on Seed Corn.

It has been observed that seed from grain thrashed by machine is not so good as that obtained by the old method of the flail. With the object of ascertaining the influence of the method of thrashing in the quality of grain intended for seed, Professor Burke, Director of an important Agricultural Institute in Switzerland, is reported in the *Mark Lane Express* to have carried out a set of investigations with wheat, rye, and barley. In the first place, the proportion of grain broken or bruised in the operation was calculated and found to be 3 per cent. with the thrashing machine and 1 per cent. with the flail. The grain was then subjected to experiments to test its germinating power. The flail seed produced 92 per cent. of plants, while the machine seed only gave 88 per cent., and of these 10 per cent. grew badly in consequence of the injury received during the thrashing operation. When the seeds were subjected to the action of sulphate of copper to render them less susceptible to attacks of plant disease, the difference was still more marked. The machine seed, in consequence of a large proportion of broken skins, was found to be very sensitive to the action of the acid, and in such cases its life-germ was probably injured; at any rate with the machine seed the loss of germination following the treatment with the chemical was 8 per cent., against 3 per cent. with the flail seed. It was also noticed that the largest grains—which would have produced the best plants—suffered most, and thus tended to deteriorate the crop in another way; in fact, in the long run it might lead to a degeneration of the species. As a result of his experiments the professor recommends that grain intended for seed should be thrashed lightly with the old-fashioned flail. This is a point that appears to be worth consideration.

### Imports and Exports of Plants, Fruits, &c.

During the month of November, 1916, 1,777bush. of fresh fruits, 12,274bush. of bananas, 11,012 bags of potatoes, 257 bags of onions, 645 packages of other vegetables, 42 packages of plants, seeds, and bulbs, 112 empty bags (60 fumigated), 789 empty casks, and 107 empty cases were examined and admitted at Adelaide and Port Adelaide under the "Vine, Fruit, and Vegetable Protection Acts of 1885 and 1910"; 154bush. of bananas (over ripe) were destroyed. Under the Federal Commerce Act 50 cases of fresh fruit, 13,757 packages of dried fruit, 710 packages of preserved fruit, and 4 packages of vegetables were exported to oversea markets. These were consigned as follows:—For London, 680 packages jam, 11,768 packages of dried fruit; for New Zealand, 370 packages of dried fruit and 50 packages of citrus fruit; for Busra, 18 packages of preserved fruit, 49 packages of dried fruit, 4 packages of vegetables, and 12 packages of jam; for Vancouver, 1,550 packages of dried fruit. Under the Federal Quarantine Act 707 packages of plants, trees, bulbs, &c., were examined and admitted from oversea sources, and 4 bags of cumin seed were detained on account of adulteration with fennel seed, &c.

# INQUIRY DEPARTMENT.

Any questions relating to methods of agriculture, horticulture, viticulture, dairying, &c., diseases of stock and poultry, insect and fungoid pests, the export of produce, and similar subjects, will be referred to the Government experts, and replies will be published in these pages for the benefit of producers generally. The name and address of the inquirer must accompany each question. Inquiries received from the question-boxes established by Branches of the Agricultural Bureau will be similarly dealt with. All correspondence should be addressed to "The Editor, *The Journal of Agriculture*, Adelaide."

## VETERINARY INQUIRIES.

[Replies supplied by Mr. F. E. Place, B.V.Sc., M.R.C.V.S., Veterinary Lecturer.]

[Extraordinary pressure on space has rendered it necessary to very considerably curtail the inquiry department. Replies to those questions of more general interest only have been published; however, every query received has been replied to through the post.—Ed.]

"E.C.M.," Parrakie, seeks treatment for pigs affected with long round worms.

Reply—Known as *Ascaris suis*. Feed cinders or charcoal regularly, and give a teaspoon of sulphur and saltpetre once a day in feed for a week. If this does not clear them give an ounce of crushed castor oil beans to each pig once a day for a few days. The drugs can be obtained through any store.

"Anxious," Nadda, has horse, five years, off pasture, has swelling on side of nose, and bleeds at nostril.

Reply—The trouble is very likely a grass seed abscess. Hurry him a little to make the veins stand out on his face, and if no big one crosses the swelling lance it and then dress with spirit of iodine.

"Anxious," Nadda, reports that pigs went suddenly mad and rushed out of sty; were found three days later all right.

Reply—Though the age is not given it may be supposed the pigs were young. The attack was an epileptic fit, due to teething and worms most likely. The regular feeding of cinders or charcoal will prevent a repetition.

"P.N.," Clanfield, has a mare, 13 years, which takes food in big mouthfuls, and spits it out again; unable to swallow.

Reply—Although the throat and teeth seem all right, the symptoms point to irregularity of the last molars, and it would be well to carefully examine them with a gag in the mouth. Grass seed abscesses in the gullet, or worm abscesses in the stomach also produce similar symptoms. Give her a handful of boiled linseed in her drinking water twice a day and a teaspoon of baking soda in her feed also for a week or two, and kindly report result of further examination.

"N. K.," Leighton, asks for a tonic for horses.

Reply—Sulphate of iron can be given in any sort of trough, galvanized or otherwise. Well-kept horses should not require a tonic as a regular thing, but if worms, etc. are suspected a course of a week or two will do good. The dose is 1 to 2 drachms daily per horse, which can be powdered and fed with greater regularity than when put in drinking water; 1lb. to 7lbs. per 1,000galls. is the usual mixture. Rusty iron in the trough provides a more readily absorbed form of iron, as it is constantly being oxidised by the action of the water.

"F. H. G. P.," Frances, reports lambs troubled with scabby mouths and feet.

Reply—The condition, known as stomatitis, has been rather prevalent in the South-East this year, but will readily yield to a dressing by rubbing a bit of moistened bluestone on the places and dabbing Stockholm tar afterward, for the feet a bit of rope dipped in tar can be run through the claws.

"R. F. M.," Taplan, has cows troubled with indigestion.

Reply—Barley stubble is somewhat dangerous to cows that have not been used to it, but if they are let on to it when they have had a good feed of softer stuff then they may remain on for an hour or two quite safely and day by day the time can be lengthened, but they should be watched, and if any become constipated it would be well to give an opening drench such as molasses.

"L. E.," Naturi, reports horses troubled with cough, nasal discharge, short breath.

Reply—The symptoms point to a form of pneumonia brought about by blood parasites, and common in your part. Rest is an essential part of the treatment, and if it cannot be given some deaths are likely to occur. Treatment—Damp food, and give a big proportion of bran. A teaspoon of saltpetre in feed every evening, and twice a day a tablespoon of tincture arsenicum for a week, a little Stockholm tar on the tongue each morning, and to the most obstinate ones 20 drops tincture aconite every night.

"J. H. J.," Inman Valley, seeks information in regard to milk fever.

Reply—Milking a cow dry during the first 24 hours after calving is very likely to bring about an attack of milk fever in a susceptible animal; it is better to leave the milking to the calf. For fuller detail see "Milk Fever," in the *Journal*, October last.

"J. M.," Wildeloo, had a filly, two years, running in paddock of green and dry feed, found swelled up and breathing hard; could not swallow drenches; died, and was found with much distended stomach.

Reply—The symptoms point to acute fermentative indigestion. In a similar case if ammonia of any sort is handy give a teaspoon with a little honey on the tongue and repeat every 20 minutes if necessary. If ammonia is not to hand give ginger, pepper, mustard, and a dessertspoonful of baking soda, either as a drench with water, or better as a ball with honey or flour.

Kanmantoo Agricultural Bureau report that a cow, five months in milk, is going dry.

Reply—At eight years a cow that goes dry in this way is not very likely to resume lactation. Ten drops tincture phytolacca morning and evening for three weeks might improve matters somewhat. It may be mixed with a spoonful of honey and smeared on the mouth.

"J. C. H.," Butler, has mare and pony; mare went stiff and died; pony seems to be going the same way.

Reply—The trouble is a poisoning of the blood cells by parasites and their excreta, these are conveyed to the system very often by means of flies. Treatment—Two tablespoonfuls of Fowler's solution of arsenic once a day for three weeks, a teaspoonful of sulphate of quinine twice a day for 10 days, green feed and regulation of bowels by 2ozs. Epsom salts twice daily if necessary.

"A. D.," Keith, has a cow with teat cut by wire; milk runs away.

Reply—Wrap ordinary sticking plaster round the teat and varnish over. Do not milk the quarter out, only relieve it as little as possible, and it will soon dry off.

"A. D.," Keith, also reports that in the case of gelding, aged, swelling of sheath commenced some months ago by sores on penis, and continues in spite of antiseptic treatment.

Reply—The hard lumps will be found to be fibrous and possibly contain gritty nodules; they are caused by worms known as *habronemata,* and these are inoculated into the system through the sores noticed by flies. It would be well to cast the horse and dissect out the lumps and treat the operation wound with spirit of iodine. It is not likely that the swelling will entirely disappear, but it may be much reduced.

"C. J. P. D.," Penola, has lambs with scabby lips and hoofs, some scummy eyed.

Reply—The scabby lips and hoofs are known as stomatitis, or cuckoo scab, and have been very prevalent in the South-East this year. They are produced by a parasite, and yield to sulphate of copper dusted on and followed by Stockholm tar for both lips and hoofs. The powder mentioned, viz., 1 carb. ammonia to 7 boric acid, will suit the eyes if dusted in occasionally. It should be kept in an airtight tin.

"J. W. M.," Halidon, reports that a sow fell while at play, and has lost use of hind quarters.

Reply—This sudden paralysis often occurs on account of worms. Rub her back with liniment daily and give 10 drops tr. nux vomica three times a day for a week, also let her have a dessertspoonful of a mixture of equal parts of saltpetre, sulphur, and charcoal in her food twice a day.

"F. G. B.," Pinnaroo, has a colt 4½ months old; supposed kicked near hind, but no mark; at first slightly lame for fortnight, then leg swelled above hock and under tail, swelling extended and very hard, hair coming off, great pain, lies mostly. Owner has seen many horses kicked, but never one with these symptoms.

Reply—The symptoms all point to that form of blood poisoning known as pyelitis and other names, or as joint ill, often referred to in these replies. The colt will probably anticipate the shooting by dying, but if not, the swelling should be lanced at its softest part and dressed twice daily with a solution of 20grs. acetozone in ½ pint of water, and two tablespoons of the same solution should be given by mouth three times a day.

## STRAWBERRIES FAILING TO FRUIT.

The non-fruiting of strawberries may usually be attributed to one of two causes, said the Horticultural Instructor, Mr. Geo. Quinn, in reply to a correspondent. 1. The plants may have been kept growing too strongly, particularly by the use of excessive water applied to richly-manured land. They will then make much foliage and runners, and a few flowers which seldom set. By way of remedy, do not force the plants, and keep the runners cut away from fruiting beds. In summer give just enough water to keep the plants alive, and then if early rains do not fall in March, apply more water, with a light dusting of superphosphate hoed in around each plant, taking care not to hoe deeply close to the plants, or valuable roots will be severed. 2. The second cause of non-setting may be due to lack of pollination taking place during the blooming period. Some kinds of strawberries bear very impotent pollen, others do not ripen the pollen sacks to synchronise with the susceptible stage of the pistils, whilst a third section bring only their pistilate, or female organs of the flower, to a perfect stage. Without seeing the blossoms or knowing the names of the sorts in question, one cannot advise on this phase. From the fact that the plants in question bore some fruits in the early stages of their lifetime, it is most likely the first supposition of the cause of non-fruitfulness is the more correct of the two.

# SOME DISEASES OF WHEAT CROPS AND THEIR TREATMENTS.

[An Address delivered by the Superintendent of Experiments, Mr. W. J. Spafford.]

## INTRODUCTION.

This subject—"Diseases of Wheat Crops and their Treatments"—is much too large a one to deal with in any way but briefly in a single address, as every individual disease would take a considerable time to discuss in detail. This being so, I will endeavor to treat the more important ones fairly fully; but those which at present do not cause much damage will be discussed but briefly. Most of what are usually spoken of as "diseases" of wheat are generally recognised nowadays as being caused by parasitic fungi or extremely small plants that live on the wheat plants, developing and reproducing themselves at the expense of the wheat plants. Although these diseases are understood by many, there are still a large number of wheatgrowers that are very ill-informed as to their exact nature; some very peculiar views are still held regarding these parasites, and there are still men who are no further advanced than were the ancients in considering them the work of an offended god or of an evil spirit. These antiquated ideas must be abandoned and a correct view taken of the nature of each disease before we can hope to successfully check or eradicate it.

## FUNGUS DISEASES.

The main point to be grasped and remembered in connection with these diseases is that all of them causing loss in the wheat fields are plants living on the wheat plants, using some of the sap that should have helped to develop the crop, for their own development and reproduction. The individual plants of these disease fungi are so small that they must be seen under a microscope before they can be distinguished as plants, and so it is easy to realise why there are still men who do not understand what the diseases are. If they were proportionately as large as is the mistletoe, so common on our gum trees, or the dodder on lucerne, everyone would know that they were plants living on the wheat; but because they cannot be recognised as plants by the naked eye does not alter the fact. What they lack in size they make up in numbers, which fact will be readily comprehended by wheatgrowers who have seen red rust or takeall prevent a crop reaching maturity, and who have noticed what a large amount of the conspicuous plant parasite, mistletoe, must be growing on a gum tree to check its development.

Once we have digested the fact that these diseases of wheat are parasitic plants we must then study the life history of each individual disease if we hope to discover means of prevention or eradication.

### SMUTS (*Ustilagineae*).

These fungus diseases of wheat—the smuts—do more damage to our crops than any other of the fungus diseases, and year in and year out possibly more than all the others put together, and they are the only diseases that do damage to the wheat crops every year in every district where this crop is grown. Indeed one of this group of diseases (bunt or stinking smut) is so bad that, if care is not taken with the seed, up to 50 per cent. of the crop might be affected, and as such lost.

These smuts as a class are characterised by producing masses of dark brownish-black spores in certain portions of the wheat plant. These spores, which are equivalent to the seeds of the higher plants, germinate at the same time as the wheat by sending out slender mycelium threads which enter the young and tender wheat plant through its pores, glide between the cells, and grow up with it. Later on these mycelium threads join together in some part of the plant—in most cases in the ear—and produce branches which bear the spores already referred to as the masses of dark brownish-black powder.

### BUNT OR STINKING SMUT (*Tilletia tritici*).

Of the smuts, bunt is by far the worst that South Australian farmers have to contend with. With this fungus the fertile branches are produced in the ear of the wheat plant, and the spores are formed inside the skin which in ordinary circumstances would have enveloped the wheat grain. This collection of spores, covered by a skin as it is, is known as a bunt ball, or smut ball, and consists of a mass of evil-smelling dark-brownish powder, from which fact arises its name, stinking smut. The damage done by the disease is the reduction of yield through the grain being replaced by the spores, and the lessened value of the grain for milling purposes, because the offensive odor and dark color of the spores spoils both the color and odor of the flour made from affected wheat.

### INFECTION OF WHEAT CROPS BY BUNT.

As the collections of spores are contained in the skins of the wheat grains, and these are held by the glumes or chaff of the wheat heads exactly as if they were sound grains, the diseased heads are harvested with the healthy ones and the spores of the bunt are mixed with the good grain at harvest time; any of this grain used for seed is already infected by the disease, and given ordinary seeding conditions the resulting crop will be diseased. This is the main infection for bunt; indeed the infection of the seed is the only one of any account in ordinary practice, and if not brought about through the crop being "bunty" it is often done by using machines already covered with spores, or putting the grain for seed into bags that had previously held "bunty" grain.

### PREVENTIVE TREATMENT FOR BUNT.

The life history of the bunt plant shows us three periods in its life when it might be possible to kill it and so prevent injury to the wheat plant, namely:—(1) After the spores have germinated and before the mycelium threads have entered the young plant; (2) while the wheat plant and the bunt plant are growing up together; and (3) when the spores are on the wheat grains to be used for seed.

(1) After the germination of the bunt spores and before the mycelium threads have entered the young wheat plant there will possibly be found some way to kill the threads of the bunt; but at present nothing can be safely used at a reasonable cost to prevent the wheat plants from being infected in the soil. We sometimes see happen in the soil what we would like to reproduce cheaply; when the seed is sown in soil that is quite dry as far as we can see, we often get clean crops of grain from untreated bunty seed. This is because there is enough moisture in the soil to germinate the bunt spores, but not enough to start the grain, with the result that there is no host plant for the threads of the fungus to enter, and so it dies.

(2) The first parts of the mycelium threads to enter the young wheat plants die as the wheat gets well above ground, so that most of the threads in a diseased plant are near to the top of the plant and none below the ground nor near it; this being so it might be possible to clear a crop from the trouble at this stage. Professor Perkins, when Principal of Roseworthy Agricultural College, thought so some years ago, and had experiments conducted with this in view. Here he had plants grown from artificially infected seed, cut off as close to the ground as possible at various stages in their growth, hoping that the mycelium threads died sufficiently early to be able to free the plants from the disease and still have time for the crops to develop properly. The crops were certainly freed from the fungus, but the cutting off had to be left so late that in a district like Roseworthy there were few springs moist enough to make a full crop after such a late cutting; this, so far as feeding off the crop was concerned, settled all chances of it being effective in any of our "early" districts.

(3) The task of finding a preventive treatment for this disease when the spores are on the seed is much simpler than in the other two cases; here what we have to find is something that will cheaply prevent the bunt spores from germinating without injuring the wheat seed. A number of methods of doing this have been discovered, chief amongst which are the use of heat and the application of fungus-killing liquids. The surest method of completely killing all bunt spores and not injuring the grain in the least degree is the heating treatment, usually done by the use of hot water. This treatment consists in dipping the bags of grain in water at a temperature of from 130 degrees F. to 134 degrees F., and leaving it at that temperature for 10 minutes to 15 minutes. This is an excellent theoretical method of treatment, but there are very few farms that have the conveniences necessary to keep water within this very limited range of temperatures—below 130 degrees F. will not kill the spores and above 134 degrees F. will kill the wheat. Next to the hot water treatment comes the use of a solution of copper sulphate or bluestone, which if intelligently handled is very efficacious. The reason I give it second place is because it is a very cheap method, generally understood by the farmers of this State; the material itself is so cheap that it is seldom adulterated, and if adulterated it is easily recognised as such.

This treatment of seed with a solution of copper sulphate to be effective in the killing of the bunt without injuring the grain rests mainly on the two following points:—(*a*) The strength of the solution in water, and (*b*) the thorough wetting of all the grain. (*a*) The solution should be at least what is known as a 1 per cent. solution, and not more than a 1½ per cent. solution, except in very exceptional cases. These strengths are represented by 1lb. of copper sulphate in 10galls. of water for a 1 per cent. solution, and 1½lbs. copper sulphate in 10galls. of water for a 1½ per cent. solution; 1 per cent. is strong enough if the seed to be pickled is not very badly infected, 1½ per cent. makes it a little surer, but is unnecessarily strong in anything but bad cases, and over 1½ per cent. certainly kills all the bunt, but also reduces the germinating powers of the grain rather considerably. (*b*) To thoroughly wet the grain with the solution some method must be used that rubs the grains well together; if this is not done air bubbles remain on the surfaces of the grains and many spores of the fungus could nestle under these and never become wet. This can be illustrated by dropping a handful of grain into a bottle containing some solution, when the air bubbles on grains are easily seen, and if the grain be left in the bottle for a week the bubbles will be found to remain intact. That each of these air bubbles might cover a lot of the spores is easily recognised if you remember that the spores are microscopic, and so small that it takes from between 2,000 and 3,000 of them placed alongside one another to extend 1in. The best method of rubbing these grains together so as to break these air bubbles is by using a shovel to turn a heap of loose wheat on a floor after pouring the requisite amount of solution on to the heap; this method will necessitate the use of about 2½galls. of solution to a bag of seed, and should be turned over from three to five times. Where no suitable floor is available the next best method of pickling with a copper sulphate solution is to put about 1bush. of seed in a bag, tie loosely, and immerse the bag in the solution for five minutes or so. There are a number of pickling machines on the market, most of which rely largely on the fact that all unbroken bunt-balls and other light material floats on the surface of the liquid and can be skimmed off. This is certainly a great advantage when the seed is dirty and badly "bunted," but it is only one part of the operation, and really not as important as rubbing the grains together to get them thoroughly wet. Seed that has been pickled with a bluestone solution can be left almost indefinitely before sowing, provided that it is thoroughly dried before being rebagged. Indeed the germination of pickled seed that has been allowed to dry and kept for some time is usually greater than if the seed is sown soon after pickling.

Another liquid used fairly largely in Australia as a preventive to bunt is formalin. This to be effective should be at least a ¼ per cent. solution, *i.e.*, 1lb. of commercial formalin in 40galls. of water. When this substance has been used the grain should be sown when still damp immediately after pickling; if allowed to dry it should not be sown for at least a fortnight, or if it becomes necessary to use the seed before that time is up it should be thoroughly wetted with water. Once grain pickled with formalin has become dry its germinating power gets less for a week, but after that time it gradually improves until one month after treatment. Formalin is a solution of a colorless gas in water, so that it is easily adulterated. In commercial formalin this should be a 40 per cent. solution of formaldehyde gas in water, but some formalin supplied to farmers at Nhill one year on analysis only showed 20 per cent. formaldehyde. Formalin is an effective pickle when guaranteed material is used and when ordinary care is taken, but because of its liability to adulteration and the need of immediately sowing the grain, bluestone at the present is the more reliable of the two.

### 2. LOOSE SMUT (*Ustilago tritici*).

This loose smut is fairly common in our wheat crops, but fortunately does but very little damage. The fertile branches of this smut are produced in the ear of the wheat plant, like it is with bunt, but in this case instead of the spores being formed only inside of the grain, the whole of the head except the stalks is replaced by spores of the fungus.

The damage done by the disease is reduced yield through some of the heads which should have carried grain being completely destroyed.

### INFECTION OF WHEAT CROPS BY LOOSE SMUT.

Plants affected by loose smut, instead of pushing out from the "sheath" sound heads of wheat as is the case with healthy plants, send out masses of blackish powdery spores. This powder soon dries on exposure, and is blown off the stalks, leaving only the rachis or central stem of head, like a skeleton amongst the good heads. These spores are carried by wind to the healthy plants alongside, which are flowering at this time, and should any of these spores find their way into flowers of the wheat they germinate, penetrate the ovary and go at once into a resting stage. The grain resulting from this ovary continues its normal development, and to all outward appearances is a normal grain, but is internally affected by the disease. If such a grain is planted the following season the resulting plant will be affected by loose smut.

### PREVENTIVE TREATMENT FOR LOOSE SMUT.

As has already been pointed out, this disease at present does but little damage to our wheat crops, but it appears to be on the increase in some countries, and might possibly get severe enough here to need some treatment. Unfortunately the treatments for the prevention of bunt have no effect on loose smut, and a special form of treatment is necessary. L. E. Melchers, Plant Pathologist of Kansas Agricultural Experimental Station, U.S.A., recommends the following treatment, and calls it the "long-time hot-water treatment":—The seed is placed in sacks and dipped in water at a temperature of 110deg. to 115deg. Fahr., and allowed to remain in the water within this range of temperature for three hours with frequent agitation. After this time the seed is removed and spread out to dry.

### 3. FLAG SMUT (*Urocystis tritici*).

This is often incorrectly known as black rust, but is essentially a smut, and not a rust. Here the fertile branches are produced in the leaves and sheath of the wheat plant, and the disease is characterised by the appearance on the leaves of long, bluish-black lines, more or less parallel to one another, and the leaves become very much twisted and curled. These lines contain a black powder, which, to the naked eye is very similar to the other smuts. The disease usually appears when the plants are young, and generally keeps them so weak that they are unable to produce heads. The damage done is often fairly great in this State, but the cause of the reduced yield is not always recognised until pointed out, as the diseased plants have broken down by harvest time, and are not readily seen unless particularly looked for. This damage is solely reduced yield through the disease preventing the plants from producing grain.

### INFECTION OF WHEAT CROPS BY FLAG SMUT.

As this fungus disease affects the leaves of the young wheat plant and rarely allows it to come into ear the chances are that infection comes in every case through the medium of the soil by spores dropping into the earth and by the affected stalks and leaves being ploughed in at fallowing time. And as these spores will pass through animals and remain alive, infection will come from the manure of animals eating affected straw or chaff.

### PREVENTIVE TREATMENT FOR FLAG SMUT.

Where this disease is found to be present to any great extent the first operation of a preventive nature should be the burning of the stubble. This will directly destroy a very large number of the spores, and will leave the land so free from rubbish that good, close fallow should result. Fields affected should be fallowed as early as possible, which will possibly lead to the germination of the fungus spores, and they will die for the want of a host plant.

Fields affected should not be sown early, indeed they should not be sown until some time after the first autumn rains, for it has been found that wheat sown early is always affected to a greater extent than that sown late in the same field. Change of crop must be practised in places where the disease has appeared, as the growing of wheat after wheat encourages the disease.

Some varieties are more liable to attacks than others, so resistant ones should always be chosen when once this fungus has been noticed.

### FUNGUS DISEASES OTHER THAN SMUTS.

The smuts are the parasitic fungi that do most damage to our wheat crops, but they are by no means the only group of fungus diseases with which we have to contend. The most important of these from the point of view of damage done over a period of years are:—
4. Takeall (*Ophiobolus graminis*). 5. Red rust (*Puccinia graminis*).
6. Wheat mildew (*Erysiphe graminis*).

### 4. TAKEALL (*Ophiobolus graminis*).

This disease is becoming increasingly troublesome to wheatgrowers in many of the farming districts of the State, but as it becomes better understood its ill effects will be very considerably reduced. The disease is a fungus growth living on and so affecting the young wheat plants, and should rather be known as wheat stem killer than takeall, as it mainly affects the bases of the stems of the wheat plant, and when present to any great extent is so severe on the plants that they only grow a few inches high before dying back. In the field it affects patches of the wheat crops, and can be recognised by the affected patches being more or less circular in shape with their centres quite bare, and the plants in the diseased circle gradually improving until the healthy plants on the edge of the ring are reached. The affected plants are usually easily recognised by the fact that the bottom two inches or so of the stems is more or less covered with a brownish powder. This latter means of recognition is of importance to the farmer, as the affection of wheat with which this disease is most often confounded is the result of climatic action, and usually spoken of in this State as the "blighting off" of the wheat crop. At one time, and to a lesser extent at present, everything that resulted in the dying back of the wheat crop was known as takeall, but we are gradually growing away from this error. The "blighting off" of wheat crops is more or less common in some seasons in some districts, and is characterised by the dying right back of individual plants and patches of plants in strong, luxuriant crops, and is caused by the moisture being dried out of strong sappy plants, through some climatic cause, quicker than the roots can make it good from the soil. If "blighted" plants be examined they will be found to have dried right down to the soil a clear shiny yellowish all the way, whereas as was already pointed out, plants affected with takeall are covered with a brownish powder or stained brown.

It has been the experience of most farmers, especially in low rainfall areas, that once a field has been affected with takeall if wheat be grown there as the next crop, even on fallow, it will be affected by the disease, and very possibly have a worse attack than the previous crop. Also that unless something be done to check the disease wheat growing will have to be given up on that particular land for a time, and some other crop grown.

### Life History of Takeall.

The spores of the fungus germinate by sending out long mycelium threads, which are the vegetative portion of the disease. These threads form masses which have a different appearance depending on their position on the plant. On the roots there are numerous dark-brown threads interlacing and spreading upwards, and it appears that the fungus spreads from one root to others by these threads. The mass of mycelium threads between the sheath and stem is termed plate mycelium, and is a continuation of the threads from the roots. This mass peels off in flakes when dry, and may possibly infect crops the following year. Then also between sheath and stem there is to be found a collection of light-brown strands joined together to form a broad band which passes upwards.

These mycelium threads draw nourishment from the wheat plants, and finally produce their fruiting portions or spore cases. The spore cases formed are flask-shaped bodies, having their swollen ends immersed in the tissues of the plant, and their necks, which are usually slightly curved, projecting from the surface; these may occur either on the roots or sheaths. Inside each spore case are numerous sacs or asci, each of which contains eight spores; so a single spore case contains an immense number of spores. When the spore cases mature the little sacs are expelled one after the other, and the spores are set free.

The spores are elongated, slender bodies divided into compartments by cross partitions.

### INFECTION OF WHEAT CROPS BY TAKEALL.

As this parasitic fungus lives on the base of the stems and roots of the wheat plant, and as the badly affected plants do not produce heads of grain, the chances are that the grain harvested from affected crops and used for seed the following year is not infected with the spores of the disease. The infection of the crops is most likely brought about in the soil, more particularly from the stems of the plants that are buried when the soil is being ploughed.

### PREVENTIVE TREATMENT FOR TAKEALL.

(1) As the straw left after harvesting an affected wheat crop is the most likely means of infection, the first step in the eradication of the disease should be the burning of the stubble. This will actually burn much affected material, and in places at least will kill many spores on the underground stems and roots by the heat generated.

(2) As the fungus has been found on many of the plants that are usually found growing on our wheat lands, properly working the fallows, keeping them free from all weeds will tend to reduce the disease.

(3) One crop that will grow more or less well wherever wheat can be grown well—the oat crop—is but seldom, and then never badly, affected by this disease. This being so, when wheat crops are affected, the disease can be checked on that land by the growing of oats instead of wheat for a few seasons, especially if this is done on well-worked fallow land. The oats not being readily attacked by the fungus tend to starve it out of the land.

(4) Until the fungus causing the trouble was isolated a few years ago, it was usual, in this State at any rate, to consider the disease as being a mechanical one. It is not long ago that a common saying amongst farmers was, "Late fallow brings takeall," and also, "Ploughing in a lot of straw or rubbish brings takeall." These two things—late fallow and ploughing in much straw—certainly appear to encourage the disease, so much so that I personally believe that the holding of the disease in check depends more on the mechanical condition of the soil than on anything.

The first method given of checking the disease—the burning of affected straw—does away with the second part of mechanical fault encouraging the disease, *i.e.*, the ploughing in of much rubbish. This burning of our straw is wrong in any system of farming, and more particularly so under a system like ours, where we burn up the organic matter very quickly by bare fallowing the land; and it should only be done after the land is properly cleared of its natural growth, when the takeall disease has been prevalent. When the disease has been checked the waste of organic matter due to burning should be made up by being extra careful to get as much as possible into the soil.

The reason that late fallow and ploughing in much straw encourages the takeall disease appears to rest on the fact that in most seasons they do not tend towards soil conditions ideally favorable to the growth of wheat, particularly when the wheat is in its earlier stages, when the disease is most active. From studying the disease for some years now I am convinced of the fact that even in soil more or less badly infected with this disease, if the wheat crop gets a really good start and continues in good healthy growth there will be hardly any evidence of the trouble. This healthy growth depends very largely on the soil being in a state of good mechanical condition, and late fallow and much dry organic matter in the soil, as a rule by no means give mechanical condition good enough to promote this growth. In its simplest form the ideal seed bed for wheat consists of soil that has been ploughed up and then so worked that only the immediate surface 2in. to 3in. is loose, and the soil immediately under it firmly compacted together. It is in a seed bed such as this that wheat will give its best yields, other things being equal, and I feel quite convinced that if seed beds like that described were always attained we would hardly know what takeall is. In the ordinary operations of bare fallowing, obtaining this seed bed is one of our main objects, even if it is done in most cases unconsciously; and if the land is ploughed early, the rains that fall compact the under surface by running the particles together, and we cultivate the surface of the land to keep it free from strong crusts and from weeds.

These operations get us somewhere near the ideal seed bed. But in the case of late fallow the ploughing is usually done after the heavy rains of the year are finished, and so not enough rains fall throughout the time between ploughing and seeding to compact the under surface soil. This leaves the soil, as it also does when a large bulk of organic matter is ploughed in, with more or less large spaces in the under layers, which when the roots of the wheat plants reach them naturally give a check to the growth of the plants; and, unfortunately, to make it worse, this check to the plants comes just at the time when the fungus is most active and when the wheat plants are weakest. In all land that is cleared, *i.e.*, free from stumps, the producing of good mechanical condition of the soil or an ideal seedbed for wheat can be brought about by the use of land rollers. As this disease spreads the use of rollers is becoming more necessary, and instead of depending so much on the rains that fall after the seed is in the soil to compact it together, as is the common practice at present, rolling the land will become just as important and necessary an operation as is harrowing. In practically all seasons a heavy rolling of the land is advantageous, but it is an essential operation when heavy rains have not fallen on the fallowed land.

### RED RUST (*Puccinia graminis*).

This disease is also a fungus parasite of wheat, but its life history is by no means as simple as is that of the smuts already dealt with. In Europe its life cycle is very complicated, and briefly is somewhat as follows:—

If we examine under the microscope the reddish powder to be found on the surface of the leaves of the wheat plant when the disease first makes its appearance, we will find them to consist of more or less oval cells on short stalks. These are the spores, and are known as uredospores; they will ripen in four or five days after they make their appearance, when they fall from their stalks and are blown from plant to plant. If there is sufficient moisture where they lodge, and if the weather conditions are warm enough, these spores germinate by sending out thin threads which grow along the surface of the plant until they reach breathing pores. They enter these breathing pores, and grow between the cells, pushing little suckers into the cells to extract their food from the wheat plant. When weather conditions are favorable—muggy weather, *i.e.*, damp warm weather—these uredospores only take a few days to reproduce themselves by thousands, and the spores formed germinate again, extract more nutriment from the plant, and repeat the process as long as the plant contains sap on which the fungus can live. This robbing of the sap of the wheat plant impoverishes it, and if weather conditions are suitable to the rapid growth of the fungus, the plant is so badly affected that it just dries up instead of maturing grain.

When the sap has left the plant the patches of spores change their color from iron-rust red to a more or less black color, and we have the second stage in the life history of the fungus. These spores have not only changed their color, but also their nature; they are now double-celled, and without stalks, and are known as teleutospores; and as they do not germinate until the following spring they are also known as resting spores. These teleutospores germinate by giving rise to short, much-branched tubes, which in a very short while produce a very small spore on the end of each of the very short branches. Now these very small spores, instead of germinating on the wheat plant, do so on an ornamental shrub known as the barberry, which is rather common in Europe, and produce what are known as cluster-cups—bell-shaped depressions filled with spores—on the underside of the leaves. These spores in the cluster-cups on the barberry are known as aecidiospores, and it is these which germinate on the wheat plant, and in a few days give rise to the uredospores—the stage of the disease that does all the damage to wheat crops.

### RED RUST IN AUSTRALIA.

The above life history of red rust is that recognised as correct for Europe, but the position in Australia is quite different, because we have no native barberries and comparatively few introduced ones. In any case no investigator has so far been able to get the rust of Australia to infect the barberry plants that are growing here, although many attempts to do so have been made; nor has any other kind of plant been found carrying the aecidiospores of the rust.

The teleutospores, or resting spores, *i.e.*, the blackish spores left on the flag and stem of the wheat after the grain is harvested, will not germinate and produce the minute spores or sporidiola until the following spring after they have had a rest. If these sporidiola would infect the wheat plant we would have no farther to look for the manner in which rust occurs whenever weather conditions are favorable, because there are always large quantities of these spores left about the whole of Australia where wheat is grown, particularly after a rusty season. But so far, however, no one has been able to prove that these minute spores produced by the growing teleutospore are capable of infecting wheat plants.

Indeed the manner in which the rust is carried over from season to season in Australia has yet to be discovered, and although much work has been done in this direction, nothing more than possible ways of continuing through the summer and winter and then attacking wheat plants have been put forward. Mr. D. McAlpine in his *Rusts of Australia,* makes the following suggestions in this connection:—

The uredospores are produced in enormous numbers and are found in the air and on the soil. These may possibly carry the disease through and be blown about by the wind to crops at a great distance from the place of their origin.

The uredospores are commonly found entangled in the "brush" of the grain; so much so that Dr. Cobb found with a number of varieties that 57 per cent. of the grains were thus affected. Pickling the seed with any of the standard fungicides would kill these spores, but with untreated seed this is a possible starting point for the disease. It is not the only source of infection, as crops from pickled seed are affected by the rust fungus.

The system of harvesting with the combined harvester, so common in this country, means much wheat on the land, which germinates with the first rains, and possibly helps in the spread of the disease.

It has been shown (Klebahn) that the rust may be communicated to wheat from some grasses, so that the native grasses may play some part in carrying the fungus over.

Professor Osborn (*Journal of Agriculture,* August, 1916) lays a good deal of stress on the likelihood of the uredospores being blown about from place to place, and so starting all outbreaks of the disease by spores that had more or less recently matured at a place possibly hundreds of miles away. He makes out a strong case for this means of infection, and if it is correct it does away altogether with the need of the aecidiospore stage of the disease as occurs in Europe.

### VISIBLE CHARACTERS OF RED RUST.

Red rust is characterised by the appearance on affected plants of small, more or less circular spots of iron-rust red powder on the leaves at heading time. If weather conditions are favorable to its development these spots very rapidly increase in size, but more in a line parallel to the veins than across the leaves, until they are long lines of red powder rather than spots. When the weather continues favorable these patches extend to the sheaths, and finally to the exposed stalk and the head. If the hand be passed along an affected stalk it will be marked by reddish lines similar in appearance to that left by fresh iron rust.

### EFFECTS OF RED RUST.

When conditions favor this disease its effect on most varieties of wheat is terrible; it will in from three weeks to one month reduce promising crops to quite useless ones for grain, and even if these be cut for hay before the rust has finished its course, the produce received is of very poor quality and low weight. It is no exaggeration to say "useless for grain," as the thousands of rust plants living on the sap of the wheat plant after it has finished extracting food from the soil, prevent the grain that had just formed when the attack started from developing, and if the crop is harvested, skins instead of grains are collected, and these are useless for anything. Even if the attack does not last until it kills the plants affected, the grain is always more or less injured, and grain from crops that have been rusted practically always weighs less per bushel than does that from rust-free crops in the same year. It reduces the weight of crops cut for hay to the extent that it used up materials from the plants, and the quality of the hay is spoilt because of the presence of so many fungus spores which do not improve the digestion of stock eating them.

### PREVENTION OF WHEAT RUST.

As this disease does not make its appearance until the spring, and as a rule not until the wheat is out in head, it is almost impossible to imagine any practical means of combating it. No possibly useful practical methods of checking or eradicating the disease once it has appeared have been suggested, and the only one that has been seriously recommended—the spraying of affected crops—is surrounded by too many difficulties to be worth a second thought.

### RUST RESISTANT AND RUST ESCAPING WHEATS.

All varieties of wheats are not liable to be affected by red rust to the same degree; some are not very subject to the disease; others are readily infected by the fungus and show plenty of evidences of the disease without being badly affected by it, others again are usually too far advanced towards maturity when the rust appears to be very badly injured; whilst others are very liable to it and are badly affected if the disease is present at all.

As has already been pointed out, the disease usually makes its appearance well on in the spring when the majority of wheats are breaking out into head, so that any wheat that is well advanced at this stage, although it may under ordinary circumstances be very liable to the attacks of the fungus, stands a good chance of reaching maturity without much injury being done to it. Wheats that miss the worst attacks of rust in this way are usually spoken of as rust escaping wheats, and they consist of "early" varieties that have a short period between flowering and ripening. Where attacks from rust are common, these wheats will usually be fairly free from much damage, providing they are sown early.

Because of some internal factor not yet understood, some varieties of wheat are not much damaged by the attacks of the disease; these wheats are known as rust resistant varieties. We know then that some varieties of wheats are rust escaping and others are rust resistant, and the only method of prevention that has proved of any practical value is to grow wheats that come under these two headings.

Rust outbreaks were very common in this State in the earlier days, but by substituting rust resistant for rust liable varieties we have considerably reduced the losses from this cause. These resistant varieties have been produced in Australia by cross-fertilisation and by selection, and we must see to it that we continue this good work—plant breeders aiming at varieties more resistant than any we have, and farmers selecting any plant they may find freer from rust than its neighbors.

### 6. WHEAT MILDEW (*Erysiphe graminis*).

This disease of wheat crops is becoming more or less common in our wheat fields, particularly in favorable years, and although it does not do much damage in Europe where it is common and practically always present, still under our conditions it may possibly develope into a serious pest and so is worth watching, and wherever possible discouraging.

The disease makes its appearance while the wheat plants are very small, and in early spring is much in evidence on the patches that are affected. Where the fungus is present, the bottom leaves and stems of the wheat plant are covered with an ashy grey to pinkish more or less felty mass of mildew, which rises like ashes when a person walks through an affected patch of crop. This mass consists of a collection of bundles of delicate threads which are seated on a slender branching mycelium. These threads are composed of numerous rounded or spherical cells attached to each other in a beadlike manner or in chains. The cells easily separate from each other and thus cause the ash-like dust that kicks up so easily. Later on this felty mass will be found to contain scattered over the white threads, brownish spherical conceptacles. Within these conceptacles are contained several sacs or spore cases called sporangia, each enclosing eight spores.

#### Effects of the Disease.

As the season advances and the summer arrives, practically all signs of the disease disappear and the crop recovers, but it cannot possibly yield as well as unaffected crops under the same conditions, particularly as it lives on the wheat crop just at the period when good healthy growth is so essential to good yields in this country.

### INFECTION OF WHEAT CROPS BY "MILDEW."

The fungus has stopped growing and dried up long before the wheat plants reach maturity, so the most likely source of infection is in the soil by falling spores and by affected straw being ploughed in. Also other grasses are liable to be attacked by this parasite, so very possibly these play a part in carrying over the disease until the particular field is again in crop. The ploughing in of manure made by animals eating affected hay or straw may also be a means of infection.

### PREVENTION OF WHEAT MILDEW.

This disease affects the leaves and the base of the stem of the wheat plants, so the burning of the stubble of affected patches will considerably help in checking the ravages of the fungus. The fungus attacks other plants of the grass family, so the fallow should be kept quite free from all weeds in those fields that show signs of the disease. If the disease is bad early in the season, the feeding off of the affected crop will help it considerably, as the admitting of sunlight and wind will kill the fungus. The patches most liable to attack are the lowlying spots of a field and these should be drained if the disease ever gets bad.

## SUMMARY.

1. The fungus diseases are the result of small plants (the fungi) living on the sap of the host plants.

2. The spores of the wheat smuts germinate at the same time as the wheat by sending out threads, which enter the young wheat plant and grow up with it, and later produce a large collection of brownish-black powder in some part of the wheat plant, usually in the ear.

### BUNT OR STINKING SMUT.

3. The spores of bunt take the place of the whole of the affected grains, except the outside skin.

4. The wheat crops are infected by the bunt spores lodging on the grain, and thus being sown with the seed.

5. The only practicable method of eradicating or checking bunt is by treating the seed with a solution of a fungicide.

6. A 1 per cent. solution of copper sulphate takes pride of place as a farmer's method of treatment.

7. For best results this solution should be poured on heaps of loose wheat on a floor and mixed with shovels until thoroughly wet.

8. A ½ per cent. solution of standard formalin is a good pickle provided the grain is sown whilst still damp.

### LOOSE SMUT.

9. The spores of loose smut take the place of the whole of affected heads except the central stalks.

10. The grain is infected with this disease by the spores dropping on the ovary; growing into it, and remaining in a resting stage until the grain germinates.

11. This disease at present does so little damage to our crops that it is not worth the expense of specially treating the seed; but should it ever get bad enough to warrant it, immersion in water at 110deg. to 115deg. Fahr. for three hours will check it.

### Flag Smut.

12. The spores of flag smut are produced on the leaves of the wheat plant, and the plants affected are usually so much weakened by the attack that they are unable to produce grain.

13. The wheat crops are infected by this disease through the soil, the spores finding their way there by dropping before the crop is harvested, and by straw or manure from affected crops being ploughed in.

14. As a means of prevention the stubble of affected crops should be burnt, land should be fallowed early, crops should not be sown early on infected soil, and only resistant varieties should be sown.

### Takeall.

15. Takeall is characterised by the more or less circular shape of the affected patches and by the presence of dark powder or stain at the base of affected straws.

16. Infection with this disease appears to come wholly from the soil, particularly from the straw of affected plants.

17. As preventive measures the stubble from affected crops should be burnt, land should be bare fallowed early and worked well to keep it free from weeds. Oats should be used as a change crop with wheat on land that has shown signs of the disease. Good mechanical condition of the soil at seeding time should be aimed at so that the young wheat plants are strong enough to grow away from the parasite. Rolling the land heavily should be resorted to whenever it is doubtful if the undersurface is well compacted together.

### Red Rust.

18. Red rust is characterised by affected wheat plants showing longish patches of iron-rust red powder on leaves, sheaths, and even stem and ear, from heading time until drying or ripening.

19. The mode of infection by rust is not yet thoroughly understood, but it appears likely that attacks are started by uredospores being blown from district to district or country to country by winds.

20. The only known method of preventing this disease is by using rust resistant and rust escaping varieties of wheat.

### Wheat Mildew.

21. This disease attacks the base of the stems and bottom leaves of the growing wheat plant and is characterised by a more or less powdery mass of ashy grey to pinkish color on the plants.

22. The chances are that infection comes from the soil by affected matter being ploughed in and by the disease being continued on other grasses.

23. Known methods of prevention are by burning the straw of affected crops, keeping fallows free from weeds, feeding off affected patches, and draining low lying spots in the fields.

# OIL PERCENTAGE IN DIFFERENT VARIETIES OF OLIVES.

[By H. E. Laffer, State Viticultural Instructor and Lecturer in Horticulture, Roseworthy Agricultural College.]

Just now, when there is a tendency towards considerable expansion of the area devoted to olive culture in this State, some information as to the relative percentages of oil in certain varieties may be of interest to those who may be planting trees.

It must be remembered that the profitable production of oil is not simply a matter of cultivating those varieties which give analytically the highest percentage. The regularity of cropping and the yields from respective varieties must be taken into account. Thus we may find that a variety giving only an average return in oil may prove more remunerative than one yielding a high proportion by reason of the former being a more regular and prolific fruiter.

Another point for consideration is the ease with which the oil is pressed from the pulp, some varieties in this respect being more easily worked than others. It would appear that some types contain a higher proportion of fats in a more or less solid condition, which can only be extracted by methods other than cold pressure.

Then, again, it will in all probability be found that the proportion of oil will vary in different seasons, localities, and soils. For this reason, results based upon the testing of fruit from one season only cannot be taken as conclusive, but at the same time they serve to indicate that there is a very wide divergence in the oil contents of different varieties grown under similar conditions.

In order to obtain some idea as to respective merits of certain named varieties growing at the College, samples were submitted to the State Agricultural Chemist (Mr. J. H. Phillips, B.Sc.), and the results of his investigations are submitted in the following table. In addition, the total fats per ton of fruit are given, taking the average specific gravity of olive oil as 0.916.

| Variety. | Per cent. Moisture. | Per cent. Oil in Fresh Olives. | Gallons Per ton. |
|---|---|---|---|
| Marchiosa | 42.36 | 27.29 | 66.73 |
| Palermo | 36.69 | 25.58 | 61.83 |
| Boutillon | 43.67 | 25.28 | 61.80 |
| Leccure | 40.11 | 24.95 | 61.00 |
| Arecuzzo | 41.46 | 23.51 | 57.50 |
| Palsand | 41.91 | 22.10 | 54.00 |
| Piegale | 39.06 | 21.75 | 53.19 |
| Unknown | 48.78 | 19.37 | 47.36 |
| Sir Geo. Grey | 43.61 | 18.19 | 44.48 |
| Bouquettier | 54.68 | 17.64 | 43.13 |
| Tarascon | 45.86 | 16.93 | 41.00 |
| Del Morocco | 54.58 | 11.54 | 28.22 |
| Smiths Variety | 49.97 | 11.51 | 28.14 |

The samples of fruit were, with two exceptions—Marchiosa and Leccure—of an even state of ripeness and falling from the trees, and all were weighed immediately after picking. The two mentioned were considerably less ripe, but owing to the rate at which the starlings were removing them, it was advisable to secure the lot at once.

The trees from which the samples were obtained were grafted as seedlings in 1906 and planted from the nursery in 1907. With one or two exceptions the 1916 crop was the first, giving a period of about nine years to come into bearing. The most prominent exception was Arecuzzo, which fruited in its sixth year, and promises to be a good cropper. It is of a low, bushy habit, carrying its fruit in clusters, and, with a good average yield of oil, looks like a variety worth cultivating. Marchiosa and Leccure both carried heavy crops in 1916, the fruit being of good size and easily gathered.

It is recognised that, for practical results, samples should be tested both analytically and by pressure for several seasons before a reliable standard can be obtained, but as a beginning in this direction and for the purpose of recording these tests, the results so far obtained are published.

# AGRICULTURAL EXPERIMENTS.—REPORT FOR YEAR 1916-1917.

[By W. J. Spafford, Superintendent of Experimental Work].

## EXPERIMENTS AT HAMMOND.

(Conducted by Mr. T. Griffin).

Since 1908 Mr. Griffin, in conjunction with the Department of Agriculture, has been conducting cultivation experiments with wheat-growing. These experiments were built up on the so-called Campbell's system of dry farming, varied to suit local conditions, and the block of land used each year was divided into equal-sized plots (five acres), each of which received different cultivation treatment. At seeding each plot was sown to the same variety and quantity of wheat, and dressed with the same quantity of superphosphate.

The results obtained over the period 1908-1915 showed—(1) That when subpacking is done just before seeding it gives, at Hammond, no increase over land not subpacked. (2) That subpacking the soil at Hammond immediately after ploughing is worth a bushel extra yield over and above that obtained from land not subpacked.

The figures showing the above results are to be found in the *Journal of Agriculture* of November, 1916.

As a bushel per acre increase for subpacking the land immediately after ploughing is not nearly sufficient to encourage farmers to speculate in an implement for which there is no other work, it was decided to change the system of plots and to find out the exact value of the subpacker as compared to the land roller, which is an implement used for purposes other than the preparation of the fallow.

### Cultivation Plots at Hammond, 1916.

The new cultivation plots at Hammond were prepared in 1915 and cropped in 1916, and consist of plots—

(1) Comparing the effects of rolling and subpacking on 6in. ploughing.

(2) Comparing the effects of rolling and subpacking on 3in. ploughing.

(3) Testing land cultivated at ploughing time and worked in the same way as ordinary ploughed fallow.

Another plot, testing the effect of cultivating the land in the early autumn and then ploughing it in May, has been included in the fallow for the 1917 crops.

*Yields from Cultivation Plots.—Hammond,* 1916.

| Plot. | Soil Treatment. | Grain per Acre. |
|---|---|---|
| | | Bush. lbs. |
| 1 | Ploughed 6in. deep and rolled the same day as ploughed; harrowed within a day or so; cultivated or harrowed whenever crust or weeds render necessary | 19 49 |
| 2 | Ploughed 6in. deep and subpacked the same day as ploughed; cultivated or harrowed whenever crust or weeds render necessary | 20 43 |
| 3 | Ploughed 3in. deep and rolled the same day as ploughed; harrowed within a day or so; cultivated or harrowed whenever crust or weeds render necessary | 18 39 |
| 4 | Ploughed 3in. deep and subpacked the same day as ploughed; cultivated or harrowed whenever crust or weeds render necessary | 18 4 |
| 5 | Cultivated (not ploughed) at ploughing time; cultivated or harrowed whenever crust or weeds render necessary | 17 14 |
| | Rainfall for year 13·42in. | |

All plots were drilled in with 1bush. of Bearded Gluyas wheat and 80lbs. superphosphate to the acre.

## WHEAT VARIETY TESTS.

As well as the cultivation tests, Mr. Griffin has, since 1908, compared each year a number of varieties of wheats sown on ordinary fallowed land with a dressing of 80lbs. superphosphate to the acre. The following table shows how some of these varieties have behaved during the above-mentioned period:—

TABLE—*Showing Yields of Some of the Varieties of Wheats tried at Hammond since* 1908, *with 80lbs. Superphosphate Per Acre.*

| Variety. | Average for 1908-11. | 1912. | 1913. | 1914. | 1915. | 1916. |
|---|---|---|---|---|---|---|
| | Bush. lbs. | Bush. lbs. | Bush. lbs. | Bush. lbs. | Bush. lbs. | Bush. lbs. |
| Federation ..... | 14 11 | 1 13 | Failure | Failure | 5 23 | 19 56 |
| Yandilla King .. | 12 9 | — | Do. | Do. | 8 25 | 23 20 |
| Gluyas......... | 13 15 | — | Do. | Do. | 8 40 | 16 9 |
| Viking ........ | 13 32 | — | — | — | — | — |
| Red Russian ... | — | — | — | — | 9 37 | 17 58 |
| King's Early ... | — | — | — | — | 4 27 | 14 13 |
| Queen Fan .... | — | — | — | — | — | 18 45 |
| Bearded Gluyas.. | — | — | — | — | — | 16 58 |
| Rainfall........ | 11·29in. | 10·77in. | 6·54in. | 8·57in. | 8·87in. | 13·42in. |

## HUNDRED OF BUTLER.

The hundred of Butler, on Eyre's Peninsula, is a comparatively new district, but it has been occupied sufficiently long for the settlers to realise that some experimental work is necessary if the most is to be made of the natural conditions. With this object the Department of Agriculture was approached, and experiments with varieties of wheats and quantities of superphosphate have been conducted during the past season, and will be continued in the future.

Much of the part of the district being farmed consists of easy-working limestone soil that has carried good mallee; and as the rainfall is a little above 16½in. per annum on the average, the solution of the most suitable varieties and the most profitable dressing of superphosphate to supply with the seed should not be very difficult to obtain, as a good deal of our older wheatgrowing country is very similar in climatic and soil conditions to that being tested.

### TESTING VARIETIES OF WHEATS IN THE HUNDRED OF BUTLER.

[Experiments conducted by Mr. S. L. Butler.]

The varieties being tested were sown on fallowed land of a light limestone nature, parts of which are fairly stony. Eighteen acres were set aside for these plots, so that three-acre plots of six varieties could be sown side by side. In June the seeding was carried out, using 1bush. of seed and 1cwt. of superphosphate to the acre for all kinds. The germination and early growth of all varieties was good, but in the spring trouble arose in the form of "take-all," and Mr. Alcock, on his visit of inspection, estimated the various varieties to be affected by the above-mentioned dread disease to the following extent:—Yandilla King, 10 per cent.; Gluyas, 25 per cent.; King's Red, 33 per cent.; Queen Fan, 50 per cent.; Firbank, 60 per cent.; Marquis, 50 per cent.

Despite the ravages of the "take-all (*Ophiobolus graminis*), some of the varieties gave fair yields, as the following results show:—

*Varieties of Wheats—Hundred of Butler,* 1916-1917.

| | Grain per Acre. | |
|---|---|---|
| | Bush. | lbs. |
| Yandilla King | 15 | 23 |
| Gluyas | 12 | 1 |
| King's Red | 10 | 19 |
| Queen Fan | 8 | 14 |
| Firbank | 5 | 34 |
| Marquis | 4 | 24 |

Rainfall for year, 15.60in.

### MANURIAL EXPERIMENTS IN THE HUNDRED OF BUTLER.

[Conducted by Mr. C. F. Jericho.]

On Mr. Jericho's farm Gluyas wheat was sown on fallowed land, with various dressings of superphosphate, using 1bush. of seed to the acre in all cases. The block of land chosen for these plots was a very nice-looking piece of fallow, well worked and fairly free from weeds; but heavy rain did not fall early enough in the season to compact it well together, nor to germinate the weeds. "Take-all" made its appearance in the spring in some of the plots, and later was more or less in evidence in all of them. Even with the presence of this trouble, the plots made good growth, and attracted a good deal of attention from the neighboring farmers. The returns are very satisfactory, considering the conditions, and are to be seen in the table following:—

*Yields from Manurial Plots —Hundred of Butler,* 1916-1917.

| | | Grain per Acre. | |
|---|---|---|---|
| | | Bush. | lbs. |
| Gluyas Wheat: | No manure | 12 | 12 |
| Gluyas Wheat: | ½cwt. superphosphate | 16 | 17 |
| Gluyas Wheat: | 1cwt. superphosphate | 16 | 32 |
| Gluyas Wheat: | 2cwts. superphosphate | 23 | 32 |
| Gluyas Wheat: | 3cwts. superphosphate | 28 | 31 |

Rainfall for year, 15.60in.

These results are not an absolute criterion of the effects of the different dressings of superphosphate for the season under review. The no-manure and the ½cwt. plots showed much "take-all" fairly early in the season, so they were each cut in half, and only the unaffected half of each was harvested for grain. The remaining plots appeared to be but very slightly affected by the disease until the machine was put in them to take off the grain, when more or less affected patches were found to be plentiful.

These plots offered a good object lesson in the checking of the wheat-crop disease "take-all." Before ploughing the field in which the plots were placed, it was found to be necessary to burn the bushes that had grown after the last crop of wheat, and in doing this some patches in the field were not sufficiently covered with bushes for the fire to run. Such an unburnt patch came across one end of the manurial plots, and it was only on this patch where "take-all" was very bad, thus showing the efficacy of fire in the control of this disease. Also, it was to be clearly seen that as the dressing of superphosphate got higher, so the amount of "take-all" became less, showing that the feeding of the crop gives it a chance to grow away from the disease.

## EXPERIMENTS AT WILKAWATT.

[Conducted by Mr. W. J. Tylor.]

On comparatively poor soil at Wilkawatt, consisting of whitish sand at the high end of the block to sandy loam at the lower end, experiments with various manures have been conducted for the past three years. The plots in 1914 and 1915 were of a preliminary nature, and were used to point the way to the best type of experiments for the special conditions of this particular district. On the results of these two seasons the various plots have been arranged as follows:—

### *Manurial Experiments with Wheat at Wilkawatt.*

In these experiments the wheat is sown on bare fallow, in the three-course rotation—bare fallow, wheat, pasture—and the treatment of the various plots is as follows:—

| Plot. | Manuring per Acre. |
|---|---|
| 1. | ½cwt. superphosphate. |
| 2. | 1cwt. superphosphate. |
| 3. | 2cwts. superphosphate. |
| 4. | 1cwt. basic slag. |
| 5. | No manure. |
| 6. | 2cwts. basic slag. |
| 7. | 2cwts. superphosphate; ½cwt. nitrate of soda (spring). |
| 8. | 2cwts. superphosphate; ½cwt. sulphate of potash (seeding). |
| 9. | 2cwts. superphosphate; ½cwt. nitrate of soda (spring); ½cwt. sulphate of potash (seeding); 5cwts. lime. |
| 10. | 5cwts. lime. |
| 11. | 5cwts. lime; 2cwts. superphosphate. |

Besides these purely manurial plots, a series of rotation plots, having as their object the improvement of these soils by a good deal of stocking and but little cropping, was commenced in 1916, with the hope of continuing the same for a fairly long period of years. Here a block of land of 25 acres was divided into five plots of 5 acres each, to be treated in the following manner:—Bare fallow; wheat (with lucerne) and 2cwts. superphosphate per acre; lucerne for grazing; lucerne for grazing; lucerne for grazing.

### *Yields of Manurial Plots—Wilkawatt,* 1916-1917.

| Plot. | Manuring per acre. | Grain per Acre. | |
|---|---|---|---|
| | | Bush. | lbs. |
| 1. | ½cwt. superphosphate | 12 | 49 |
| 2. | 1cwt. superphosphate | 13 | 42 |
| 3. | 2cwts. superphosphate | 19 | 39 |
| 4. | 1cwt. basic slag | 12 | 32 |
| 5. | No manure | 12 | 6 |
| 6. | 2cwts. basic slag | 18 | 56 |
| 7. | 2cwts. superphosphate; ½cwt. nitrate of soda (spring) | 22 | 17 |
| 8. | 2cwts. superphosphate; ½cwt. sulphate of potash (seeding) | 21 | 7 |
| 9. | 2cwts. superphosphate; ½cwt. nitrate of soda; ½cwt. sulphate of potash; 5cwts. lime | 21 | 18 |
| 10. | 5cwts. lime | 14 | 49 |
| 11. | 5cwts. lime; 2cwts. superphosphate | 18 | 37 |

One bushel of Baroota Wonder wheat was drilled in to the acre on all of the plots.

For each of the three years from 1914 to 1916 the following plots were harvested, the results from which certainly show the advantage of using a dressing of up to 1cwt. of superphosphate per acre:—

| Plot. | Manure per Acre. | Grain per Acre. | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1914. | | 1915. | | 1916. | | Means 1914–1916. | |
| | | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. |
| 5...... | No manure .................. | 1 | 11 | 8 | 43 | 12 | 6 | 7 | 20 |
| 1...... | ½cwt. superphosphate ........ | 3 | 34 | 9 | 16 | 12 | 49 | 8 | 33 |
| 2...... | 1cwt. superphosphate ........ | 3 | 56 | 15 | 17 | 13 | 42 | 10 | 58 |

This shows an increase of a little over 3½bush. where 1cwt. superphosphate was used as a dressing, which, at 3s. 6d. per bushel, is considerably above the cost of the manure.

For the last two seasons the following plots were harvested, the results from which are appended:—

| Plot. | Manure per Acre. | Grain per Acre. | | | | | |
|---|---|---|---|---|---|---|---|
| | | 1915. | | 1916. | | Means 1915–1916. | |
| | | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. |
| 1...... | ½cwt. superphosphate .................... | 9 | 16 | 12 | 49 | 11 | 2 |
| 2...... | 1cwt. superphosphate .................... | 15 | 17 | 13 | 42 | 14 | 29 |
| 3...... | 2cwts. superphosphate .................. | 21 | 8 | 19 | 39 | 20 | 23 |
| 4...... | 1cwt. basic slag ........................ | 11 | 38 | 12 | 32 | 12 | 5 |
| 5...... | No manure ............................ | 8 | 43 | 12 | 6 | 10 | 24 |
| 6...... | 2cwts. basic slag ........................ | 13 | 37 | 18 | 56 | 16 | 16 |

These results again show the advantage of fairly heavy dressings of superphosphate with wheat; the 2cwt. dressing shows 10bush. increase on no manure; 9 1-3bush. on ½cwt.; and 6bush. on 1cwt. dressing.

### *Rotation Plots—Wilkawatt.*

The rotation plots are each about 5 acres in area, and consist of rather poor soil, both ends of each plot being white sandhills, whilst the centre is a rather light sandy loam, with a few silt hollows that hold water rather tenaciously. So far the wheat crops have not come on land that has had lucerne grazed off, so they are only ordinary fallow results.

*Yields of Wheat in Rotation Plots—Wilkawatt,* 1915-1916.

| | Grain per Acre. | | | | | |
|---|---|---|---|---|---|---|
| | 1915. | | 1916. | | Means 1915–1916. | |
| | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. |
| Wheat with 2cwts. superphosphate | 10 | 46 | 12 | 8 | 11 | 27 |

## KANGAROO ISLAND.

[Conducted by Col. J. W. Castine.]

After a lapse of one year, the experimental plots at Col. Castine's farm, "The Springs," on Kangaroo Island, were continued. The previous attempts at cereal growing on this ironstone country, despite the very favorable rainfall, were anything but successful, so the experiments were confined to manurial tests with the two cereals most likely to prove of some use under these particular conditions, viz., rye and oats. The soil conditions at "The Springs" are quite different from anything on the mainland, and although the season under review was very favorable to the cereals throughout the bulk of the State, it did not prove so with these plots, as the following tables of results show:—

*Yields of Oats at Kangaroo Island,* 1916-1917.

| Plot. | Manure per Acre. | Grain per Acre. Bush. | lbs. |
|---|---|---|---|
| 1. | 2cwts. basic slag | 1 | 3 |
| 2. | 2cwts. superphosphate | 1 | 28 |
| 3. | 2cwts. basic slag; ½cwt. nitrate of lime | 1 | 11 |
| 4. | No manure | Failure | |
| 5. | 2cwts. basic slag; ½cwt. sulphate of potash | 1 | 29 |
| 6. | 2cwts. basic slag | 2 | 15 |
| 7. | 3cwts. basic slag; 1cwt. sulphate of potash; 1cwt. nitrate of lime | 1 | 4 |
| 8. | 3cwts. basic slag | 1 | 21 |
| 9. | 1cwt. "Ephos" basic phosphate | 1 | 1 |
| 10. | 2cwts. "Ephos" basic phosphate | 1 | 15 |
| 11. | No manure | 1 | 3 |
| 12. | 3cwts. bonedust | 0 | 38 |
| 13. | 2cwts. basic slag; 4cwts. hashmagandy | 1 | 17 |
| 14. | 2cwts. basic slag; 1cwt. hashmagandy | 1 | 13 |
| 15. | No manure | 0 | 34 |

Algerian oats were sown on all plots, at the rate of 1½bush. per acre.

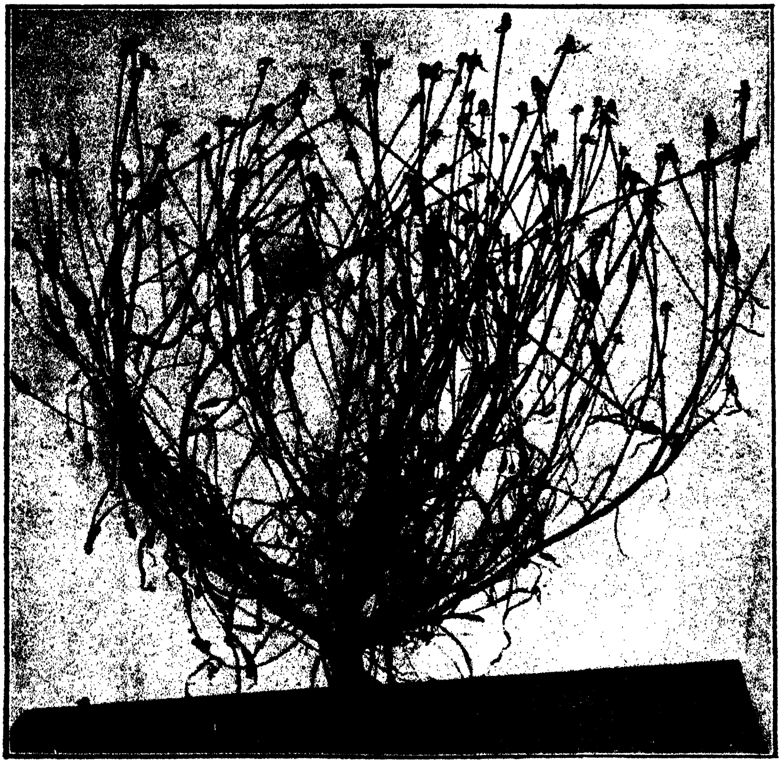
*Yields of Rye at Kangaroo Island,* 1916-1917.

| Plot. | Manure per Acre. | Grain per Acre. Bush. | lbs. |
|---|---|---|---|
| 16. | No manure | 3 | 30 |
| 17. | 2cwts. basic slag | 4 | 33 |
| 18. | 2cwts. basic slag; ½cwt. nitrate of soda | 4 | 11 |
| 19. | 2cwts. bonedust | 2 | 0 |
| 20. | 2cwts. basic slag; 2cwts. hashmagandy | 1 | 47 |
| 21. | 2cwts. superphosphate | 1 | 48 |

# A NEW WEED.

[By H. W. Andrew, Botanical Assistant and Quarantine Officer for Plants, S.A.]

During the year 1916 at least seven introduced weeds were discovered for the first time in this State. Among those found by the writer another remains yet to be placed on record in this *Journal*. This weed was found on neglected cultivated land at Collinswood, in the District Council of Prospect, and, judging by its present distribution, has been established for a few years, although apparently confined to that locality.



### Scorzonera laciniata, L.

This plant, also known as *Podospermum laciniatum*, DC., is represented by a few score specimens only. It is a biennial (or perennial?) up to 20in. high, with a taproot like that of the salsafy (*Tragopogon porrifolius*), to which it is nearly related. Specimens here have ascending branches with lateral spreading stems, leaves much divided (*pinnatisect*) with linear or linear lanceolate segments. The achenes, or "seeds," sub-cylindrical, striate, and supported by a hollow pedicel a little shorter than the achene with feathery pappus of a dirty white. Flowers pale yellow, scarcely exceeding the involucre. A close examination of the accompanying figure will reveal the rather distinctive globular head of seeds, somewhat resembling the heads of the true dandelion, or those of salsafy, both of which have established themselves on the plains of Adelaide and other parts of the State. Since a great number of flower heads are found on one plant, and as each head contains up to 60 or more "seeds," and further, as each seed is provided with a feathery pappus to aid in its dispersal, it is likely that this plant will become more widely distributed unless steps be taken to check or exterminate it. At the time of writing the ground immediately around growing plants is white with the numerous seeds shed by them. The whole plant presents a very weedy appearance; and its value as a fodder plant, if any, would be largely discounted by its spreading, weedy habit, which would probably smother more useful fodder plants. Although an exceedingly large family of plants, the *Compositae,* or daisy family furnishes comparatively few fodder plants. At least two species of *Scorzonera,* however, are cultivated in Europe, and used as an esculent vegetable, viz., *Scorzonera hispanica* and *S. deliciosa.* The species described above is reported to be the commonest of this group of the family occurring in the Mediterranean region.

# THE MANURING OF VINEYARDS.

[An Address delivered before the Berri Branch by H. E. LAFFER, Viticultural Instructor.]

The question of manuring vineyards is one which is receiving greater consideration from year to year, and which will, in the near future, become of more importance to the viticulturist. In the irrigation settlements along the Murray, where the land is relatively poor, and heavy crops are removed annually, it is a matter of paramount importance. This land, which is so admirably suited to irrigation, produces luxuriant growth and very heavy returns of fruit, largely owing to the latent fertility which is made available by the application of abundance of water during the growing period of the vines. In addition, there is the fact that in these loose open soils the vines root so freely that they draw nourishment from a relatively large bulk of soil, and thus for a number of years appear to secure sufficient food for all their needs. The time will come, however, when they will fail to maintain this vigor, owing to the greater difficulty of securing supplies readily, a fact which is evidenced by the necessity to reduce the number of arms upon the vines. It is recognised that vines, in common with all our cultivated plants, draw from the soil certain elements of plant food which bear a definite relation one to another in the different plants under consideration. It follows, naturally, that if the fertility of the soil is to be maintained, and returns in the form of fruit kept up to normal, these plant food elements must be brought within easy reach of the plants by artificial means.

So far, in Australia, little has been done in the way of consistent manurial experiments upon vines, although in the older countries the application of fertilisers to the vineyards is a part of the annual cultural operations.

With the high cost of labor under Australian conditions, coupled with low average returns from our vines, the production of heavier yields from smaller areas should be the aim of the vigneron.

Although we have certain rules to guide us in the practice of manuring, no hard-and-fast rule can be laid down for general conditions. The success attending the practice depends upon local factors, such as climate, soil, and the available moisture supply. Probably the last-named is the most important, for unless there is ample moisture to make the manure available, and to transmit it throughout the system of the vine, there will be little or no result. In this respect, it may be said that the Murray Irrigation Settlements are ideal for effective manuring of the vines. The soil is relatively poor, from an agricultural point of view, and lends itself readily to the application of fertilisers, while the summer irrigation supplies the moisture which makes available the active principle of the manures at the time when it is most needed.

It has been said already that the vine requires certain definite proportions of the plant foods, and although these may be fairly abundant in a soil, and create luxuriant growth for the first few years, there comes a time when the vine has to do a great deal more searching with its roots before these wants are supplied. It does not necessarily follow that the supply is exhausted, but rather that the more available portion of the plant food has been used up. The balance will be in more or less insoluble compounds, the splitting up of which may be a comparatively slow process, so that the needs of the plant may be fulfilled only with difficulty. It is then that one finds that the vine may have too many arms, or is given too much fruit wood, the growth and returns suffering in consequence; and if this growth is to be maintained, then we must provide for the vine the required nourishment in a readily accessible form.

The main elements required by the vine as plant food are the same as in the case of most other plants, namely, nitrogen, phosphoric acid, potash, and lime; and these are required in such quantity as to render the exhaustion of the available supply a reasonable possibility. Of other substances, such as iron, magnesia, &c., the quantities used annually are so small as to have little effect on the available supply.

Thus we find, in any system of manuring, that it resolves itself into a question of profitably applying manures of a nitrogenous, phosphatic, or potassic nature. The question of lime will be referred to later, as representing more value as an improvement to the texture of the soil than as a direct fertiliser.

### Nitrogenous Manures.

Of this class we have two main types—those of organic origin and those of inorganic or mineral origin. The former is derived from decayed organic matter of any description until it becomes incorporated with the soil. It supplies during the process of decay that all-important soil constituent, humus, which is so necessary, not only as a source of fertility, but as a means of increasing the moisture-retaining capacity of a soil. This may be considered as one of the most essential points in the manuring of Australian vineyards—that is, the increase of humus in the soil, and any system which will serve to this end cannot be other than advantageous.

Unfortunately, except for limited areas, the use of farmyard manure is out of the question, owing largely to the fact that supplies are not available. Where this commodity is obtainable, even if its use is confined to small areas, its value as a fertiliser and improvement to soil texture cannot be over estimated. It supplies not only humus, but on the decomposition of its substance, quantities of all the necessary fertilising elements are liberated. Incidentally, by its presence in the soil, the texture and moisture retaining capacity of such soil is improved.

It may be said, then, that with few exceptions, farmyard manure is out of the question for areas of any considerable extent; but there remains the practice of "green manuring," which is a practicable undertaking even in large vineyards. Described briefly, the system as practised consists in growing some crops between the rows of vines or fruit trees, sowing in the autumn, and ploughing under in the late winter, when the plants composing the crop are in a succulent state.

For the most part, plants of the legume family are adopted, as being in themselves nitrogen gatherers, and the most commonly used is field peas.

As a fertiliser to the crop for its immediate needs, superphosphate is applied at time of sowing, and as the legumes require large quantities of potash, this manure may be applied in small quantities in conjunction with the super. At the present time potassic manures are unobtainable; but, after all, super. by itself is in most cases sufficient for the needs of the crop.

Ploughed in just about the time the peas are flowering, or before if conditions of climate make it imperative, the substance of the crop decays down rapidly, to become incorporated with the soil. In the light lands of the irrigation settlements, nitrification is a rapid process, and this organic matter quickly becomes available to the plants, promoting health and vigor in the vines.

On the light irrigable lands this practice should commend itself for trial in any scheme of manurial experiments. A green leguminous crop, grown with super. and ploughed in, should represent practically the equivalent of good farmyard manure, with the added advantage that its decay is rapid.

Mineral nitrogen as a fertiliser is represented by ammonium sulphate and sodium nitrate, both of which are available, and are very active agents in creating vigor in the vine. It has to be remembered that their cost is relatively high, and so they should not be used in quantities excessive to the demands of the vines on any one soil. No hard-and-fast rule can be laid down, but the question as to quantity should be determined by careful experiment. In fact, the whole practice of vineyard manuring is largely a matter for experiment at the present time, and it is only by carefully tabulating results for a number of years that any reliable estimate can be arrived at. As a basis for working upon, quantities of from 1cwt. to 2cwts. per acre applied during the early growing period might be tried.

In connection with irrigated vineyards, there is one point to be considered in the use of nitrogenous fertilisers, viz., guarding against the production of too luxuriant foliage. This might tend, especially if the potash and phosphoric acid were deficient, to lead to a more pronounced unevenness of ripening in the case of currants. However, that is a matter which can be easily overcome. Given that other conditions are suitable to growth, it is often astonishing how well vines do in soils which are comparatively deficient in nitrogen.

### POTASSIC MANURES.

While the nitrogenous substances absorbed by the vine or tree go to the building up of the foliage and woody structure, potassic elements are concentrated almost entirely in the fruit. This is amply demonstrated in the grape by the fact that the fruit is highly charged with potassic salts, the chief of which being cream of tartar, or acid potassium tartrate. The whole of the world's supply of this commodity is derived from the wine industry.

Potash, then, is a very necessary element in the nourishment of the vine, and soils rich in potash are noted for heavy production of fruit. Most of our soils in South Australia are plentifully supplied with potash in some form or other, although it may not be readily available to plants.

The use of potassic manures is one which should receive attention in the Murray settlements, where vines are grown under forced circumstances, and are encouraged to carry very heavy crops of fruit on relatively poor land. There can be no denying that these same vines have remained vigorous over a considerable number of years, but the time must come when more attention must be given to the maintenance of the natural fertility of the soils.

Unfortunately, at the present time potassic manures are unobtainable; but no doubt research will demonstrate that the world's supply is not confined to Germany.

Potash, in the form of either the sulphate or chloride, is expensive, and, as already stated, most soils have a good reserve supply. It is only necessary to supplement this with light quantities of readily soluble potassic salts. We apply potash in the form of sulphate or chloride, these being the most convenient forms available; but in these forms it cannot be assimilated by plants. It must first undergo a reversion to potassium carbonate, and it is in this connection that the use of gypsum is at times highly advantageous to soils rich in potash.

As already stated, the potash supply in a soil may be extensive, but unavailable to the plants, because it is out of reach of the root system.

Nature holds potash in the form of carbonate in the surface soil, so that deep-rooted plants are unable to touch it. If to such a soil we apply a dressing of gypsum (calcium sulphate), a chemical reaction takes place, and on the one hand we have formed potassium sulphate, on the other calcium carbonate, or lime.

As sulphate, the potash is dissolved and carried down to the deeper soil layers, but it is in a form of no use to the plants. A further reaction takes place, the sulphate becomes sulphide, and finally the sulphide becomes carbonate. Thus we have the potassium carbonate deep down where the roots of the vine can reach it. This reaction is of special importance in the heavier classes of land, which, at the same time, are usually richest in potash.

In the artificial form potassic manures are costly, and must be used with discretion. If they lead to heavier crops of fruit, it must be remembered that the tax upon the other portions of the vine will be proportionately greater and the vigor of vegetation must be kept up to normal pitch by supplying the needs of the vegetative organs, in order to preserve the balance between fruit and vegetation.

Quantities varying from ½cwt. to 1cwt. per acre should be sufficient to serve the needs of most soils when supplementing the natural supply. It may be applied in the winter ploughing, or where irrigation is practised, it may be applied and washed down by the first watering.

### PHOSPHORIC ACID.

This important element of plant food appears to be more general in its influence upon the vine. It conduces towards the general health of the vine, and is said to play an important part in the ripening of the wood. It is well known that our soils are lacking in phosphates, and I am inclined to the opinion that upon the Murray Settlements more benefit will be derived from the use of phosphates than from any one manure.

Fortunately, the supply of phosphatic manures is unlimited, and is obtainable with a high degree of solubility at a cheap rate.

The only difficulty would appear to be in the method of application, and this is a matter which depends primarily on the nature of the soil.

It has been demonstrated that soils of a heavy nature have the power of retaining the phosphoric acid in the surface, and therefore in soils of this description it is wise to place the phosphate as deep down as possible.

In the lighter soils of an open, sandy or gravelly nature, especially where irrigated, there is no great difficulty. On this class of soils phosphatic manures should give quick and satisfactory returns, and should receive consideration from every irrigationist who desires to maintain the vigor and production of his vines at high level.

Sickly vines produce sickly fruit, and if the quality of our dried fruits is to be kept at its present high standard, we must see that the vines are healthy and of normal vigor.

In conclusion, I should like to say that this matter of manuring vines is worthy of early attention, not waiting to see the vines show appreciable signs of debility. Such debility may mean a diminished crop for the time being, and a loss in value which would fertilise the vineyard for a number of years. In addition, it is far easier to maintain the normal vigor of the vines than it is to renew this vigor once they are appreciably weakened.

It is estimated that vines remove from the soil each year approximately 45lbs. nitrogen, 40bs. potash, and 10bs. phosphoric acid per acre, a loss which in the strong rich soil may not be felt for a great number of years. On light soils, such as are being irrigated along the Murray, where the growth and production are forced by the heat and water, the time is not far distant when a regular system of manuring will become an annual practice.

### LIME AND GYPSUM.

Lime and gypsum have already been mentioned in connection with manures.

There are very few vineyard soils in South Australia but have sufficient lime in their composition to supply all needs of the vine in the form of food. It is as "improvers" to soil that they play their most important part.

Clay soils devoid of lime are impermeable to water, and almost unworkable, owing to their sticky nature. Lime possesses the power of flocculating the clay particles, making it more crumbly and open in nature. Water can soak down, and the roots of plants find easier passage in their search for food. Insoluble compounds are attacked, being split up to form simpler water-soluble substances.

Considering ordinary lime first, we have the two forms, or perhaps three. The first is the plain, unburned ground limestone or calcium carbonate; secondly, there is quick lime; and, thirdly, slaked lime.

Of the three, quick lime is the most active in its effects upon clay soils so far as flocculating is concerned. On the Murray, the bulk of the irrigated land is not needing this treatment, the exceptions being some of the heavy flat land closer to the river. On these portions lime in one or other of its forms would no doubt be beneficial.

Gypsum has already been referred to in its action upon the potash salts in clay soils, and it is in this respect that it is most useful. In its action on soils generally it is not such an active agent as lime. At the same time, it has a considerable effect on the texture of the soil, and is a valuable remedy for soils too stiff in their nature.

Of the other substances mentioned as necessary to the welfare of the plants, most soils contain a sufficiency to supply all needs, and it therefore becomes superfluous to apply as dressings to a vineyard.

# SOME POINTS IN WHEAT-GROWING

[An address delivered by Mr. W. J. SPAFFORD (Superintendent of Experiments), before the members of the Milang Branch of the Agricultural Bureau.]

The wheat crop will be the most important crop that can be grown for many centuries to come, for it is one of the main foods of the civilised portions of the human race, and is becoming increasingly so, as the people of the East are just beginning to make it one of their ordinary foods. Even without the increased requirements due to new people using wheat, the populations of wheat-eating nations are increasing very much more rapidly than is the supply of the grain, and so the demand for it must increase.

Wheat can be grown more or less successfully in all parts of this State where the rainfall is sufficient to supply the crop's water requirements, but to make the most of the crop there are some points in the operations connected with its growth which are absolutely essential, and it is to these essentials that I wish to refer.

## REQUIREMENTS OF THE WHEAT PLANT.

The wheat plant, like all other forms of life, needs food, moisture, warmth, oxygen, and a medium in which to live. Now, the plant starts its growth from the seed—or grain, as we usually know it—by sending out a shoot and roots, when this seed remains in contact with moisture and when the temperature is sufficiently high. This shoot and the roots live and grow by using up the food stored in the seed, and when this is all gone the plant has to supply its own food. What these necessary foods are will be shown if we analyse a full-grown wheat plant, and it will help us to realise how, and from where, the various substances contained in such a plant are obtained.

In the first place, if we weigh the plant, and then heat it to the boiling point of water, and keep it at that temperature for some time, and then re-weigh it, the difference in weight will show the amount of moisture that the plant contained.

If the plant be now burnt, only a very small quantity of ashes will remain, and that which was destroyed in the burning represents the carbon, whilst the ashes consist of the mineral matters. This ash is then chemically analysed, and the various mineral substances of which it is composed are separated and weighed.

An analysis like this shows the average wheat crop to consist of:—

*Table showing the Composition of Wheat—Grain and Straw (from "Artificial Manures," by Ville).*

| | Per cent. | |
|---|---|---|
| Carbon | 47.69 | These 93.55 parts are derived from the air and rain. |
| Hydrogen | 5.54 | |
| Oxygen | 40.32 | |
| Soda | 0.09 | Total 3.386. The soil is superabundantly provided with these constituents, which it is quite unnecessary to add to it. |
| Magnesia | 0.20 | |
| Sulphuric acid | 0.31 | |
| Chlorine | 0.03 | |
| Ferric oxide | 0.06 | |
| Silica | 2.75 | |
| Manganese | (?) | |
| Nitrogen | 1.60 | Total 3.00. These the soil possesses only to a limited extent, and the deficiency is supplied by artificial manure. |
| Phosphoric acid | 0.45 | |
| Potash | 0.66 | |
| Lime | 0.29 | |

Now of these substances the carbon is obtained from the carbonic acid gas of the air, by its entry into the leaves through the breathing pores, and is then split up by the chlorophyll, or green coloring matter.

All of the mineral substances are taken up by the roots of the plants, and as these roots are all in the soil the only place that they can obtain these minerals is from the soil. Besides these mineral matters the plant also takes its moisture from the soil. The necessary oxygen is taken mainly from the air by the breathing pores of the leaves, but also by the roots from the air imprisoned in the soil.

The soil, besides supplying the mineral plant food, the moisture, and some of the oxygen, must also be the medium in which the plant is anchored for life, and must be in such a state that the roots can move freely in search of their requirements.

### PREPARATION OF THE LAND.

As the warmth is supplied by the sun, and as the carbonic acid gas and the oxygen are always plentiful in the air, we have no concern, or at all events no control of these substances, and so we can direct our attention to the soil, the supplier of the other essentials to the plant's growth. The soil to carry a crop of wheat must contain the foods necessary to its good growth in such a form that they are readily available to the plants: it must contain sufficient moisture for the requirements of plants, and it must be in such a state of tilth or mechanical condition that the roots can travel freely through it in their search for food, moisture, and air.

Also wheat is a plant that has been cultivated and pampered for thousands of years, and as such is wholly dependent on the help of man to make good growth, and it is by the way man cultivates the soil that he helps the plant more than by anything else he may do.

### THE SEED BED.

If the plant foods and the moisture necessary to the wheat plants are present in the soil, the period in its growth at which the condition of the soil has the greatest influence on the plant is when the plant is young—from the germination until it is some few inches high; and as we cannot do much to the soil after the seed has been put in, it must be prepared before seeding operations commence, and we usually speak of this prepared soil as the "seed bed." It is this seed bed that plays such an important part—particularly in a climate similar to ours—in what will be the ultimate success of the crop.

The experience of thousands of years has shown the ideal seed bed to produce the maximum crops of wheat to consist of soil that has been ploughed up, and then so worked that it is free from weeds and has only the immediate surface loose—say 1½in. to 2½in.—and the under-layers well compacted together. This seed bed should be always kept in mind, and every tillage operation conducted should do something towards helping to ultimately produce such a condition of the soil.

### IN LOCAL PRACTICES.

Where we include bare fallow before wheat in our practice, this seed bed is easily attained. Here we plough the land as soon after seeding operations as possible, and before the heavy rains are finished; these rains compact the soil together again, and we cultivate the surface to keep it free from weeds, and to prevent the formation of a crust on the surface of the soil, with its consequent loss of moisture. To have the soil in the right state of tilth at seeding time, the ploughing should be done as deep as local conditions allow, but the subsequent operations should be only just as deep as is necessary to do the work required. If for any reason a cultivation of any kind has to be done deeply—say, more than 3in.—and fairly plenteous rain does not fall soon after, the damage done by loosening the compacted under-layers should be corrected by a more or less heavy rolling shortly after cultivation.

Where wheat is sown on land not bare fallowed, this seed bed must be produced in a short space of time, and the simplest way to get anywhere near the mark is to plough the land as shallow as is possible to make a good job of it, roll to press the soil and the organic matter ploughed under together, and cultivate in some way before the seed goes into the soil. This very shallow ploughing is not good for the soil, and so not good for the State, so wherever possible the soil should be ploughed well and very heavily rolled to thoroughly compact the soil together, and then the surface should be worked so that it will properly cover the seed.

## MANURES.

The average analysis of the wheat plant quoted above shows what mineral matters must be present in an available form in the soil to enable the wheat plants to make good growth. Soil analyses and general experiences have shown that of the essential plant foods to be got from the soil the only ones at all likely to be deficient are potash, nitrogen, phosphoric acid, and lime, and so these are the only ones that need be applied to the soil for maximum results.

## POTASH.

The bulk of South Australian soils show on analysis to be particularly rich in potash, and experience has confirmed this by the almost uniform failure of potassic manures on our soils. These fertilisers have been tried on various soils a large number of times, and it can be confidently stated that at the present time potash does not pay for its application for wheatgrowing in this State on any but very light sandy soils.

## NITROGEN.

Nitrogen is absolutely essential to the growth of plants, and most soils contain but little naturally, for it washes so readily out of them. And in heavy-rainfall countries it is necessary to replace this nitrogen by applications of nitrogenous manures, and by the growth of nitrogen-storing plants, if good crops of wheat are to be grown. This has not so far proved necessary, however, in the parts of this State where bare fallowing is carried out, because the warmth we experience encourages the activities of the nitrogen-storing bacteria present in the soil. In places where bare fallowing is not carried out, and where leguminous crops—the only nitrogen-storing plants—are not grown, some nitrogen should be put into the soil as a fertiliser. For this purpose ½cwt. to 1cwt. to the acre of nitrate of soda or sulphate of ammonia should be applied to the crop of wheat for the best results; failing these farmyard manure should be applied to the land to some crop preceding the wheat crop.

## PHOSPHORIC ACID.

Phosphoric acid is an absolutely essential plant food, and South Australian soils show on analysis to be rather deficient in this important substance. The experience of our wheatgrowers carries this out, and from one end of this country to the other, to get anything like payable returns from wheat, it has been found necessary to apply phosphoric acid in some form or other as a fertiliser. The most successful manure in this direction has proved to be superphosphate of lime, but the ideal quantity to use varies with the particular local conditions. On the average where bare fallow-wheat is the practice, 1cwt. superphosphate

(36/38) gives the maximum profit over the expenditure; where bare fallow-wheat-pasture is carried out, and where a set rotation of crops is maintained, all of the crops being manured, 2cwts. per acre is the best application. Of the other common phosphatic manures none have so far proved equal to superphosphate, the basic slag, bonedust, and rock phosphate proving too slow of action.

### ORGANIC MATTER.

Organic matter is not necessarily a manure, but it plays a very important part in the condition of the soil. It improves the condition of heavy soils and light sandy soils, making them more tractable; it helps the soil to absorb and retain moisture, and encourages, or, indeed, makes possible, the activities of the useful soil bacteria. Heavy soils without organic matter become unworkable, and light sandy soils blow away; so that the amount of this material in a soil should never be allowed to get low. The fertility of the soil also depends very largely on the proportion of organic matter it contains. The necessary amount for good fertility and good mechanical condition is kept in the soil by applications of farmyard manure, by ploughing in green crops and stubble, and by keeping and feeding livestock on the land.

### LIME.

Lime is a plant food to a small degree, but is rarely that deficient in soils as to be necessary to apply it with this object. It is more important in that it plays a very great part in keeping the soil in good mechanical condition, and in making the soil a good medium for plants to live in. It counteracts excessive acidity of soils, a condition not conducive to the good growth of wheat. This acidity also prevents the formation of nitrates by the soil bacteria, as it is an unhealthy medium for bacteria, and there is no free base to combine with the nitrogen collected. It helps liberate potash for the use of plants, and also allows plants to make the full use of phosphates applied. Lime makes heavy clay soils much freer for cultivation by coagulating the particles, and improves the texture to some extent of light soils.

### POSITION OF THE WHEAT CROP.

Wheat is the most important crop grown, and so where a variety of crops is grown, including wheat, it should always have pride of place, which means that it should always take its turn when the soil is in the best heart. Wherever bare fallow is included in a rotation, wheat should be the crop that is sown on it, other crops following the wheat, not it following them. Where rotations of crops which do not include bare fallow are conducted, one of the crops should always be a leguminous crop, to return some nitrogen to the soil; and then the wheat crop should follow the legume. When this is not done one crop should return much organic matter to the soil and another should be a "worked" crop, *i.e.*, grown in rows and cultivated during growth between the rows, and the wheat should follow this cultivated crop.

### Depth of Seeding.

A point in wheatgrowing too often neglected in this State is the depth to which the seed is put into the land. It is too common to always put the lever of the drill at a certain notch, no matter whether the wheels of the machine sink into the land or not. That this depth of seeding is of importance was borne out by experiments conducted at Roseworthy Agricultural College. Here we found that the depth to sow wheat for the best results was from 1in. to 2in., a much less depth than is usually given to the seed. A full report of these experiments is to be seen in the *Journal of Agriculture* for August, 1911 to January, 1912.

### Varieties.

There are hundreds of varieties of wheats, and as they have been evolved for the special conditions of different districts, it is only reasonable to expect that they will not be all equally suitable to any given district. This is certainly so, and in a locality where one variety may yield 30bush. per acre, there are hundreds that will not yield 10bush. per acre. The difference between individual varieties is so great that it is quite necessary for every grower to be certain that he is growing the one from which he is getting the greatest possible return. This cannot be done unless someone in the district—better if it is you—keeps on trying new varieties. Every year sees some good new varieties put on the market, and for years you may be growing a lot of what was the best variety for your conditions five years ago, whereas a new variety that would outyield your favorite by perhaps bushels per acre has come out. Of course, no one can possibly try under field conditions all the varieties he may hear of, but varieties that do well in conditions somewhat similar to your own are always worth trying. One acre for three consecutive years is all that is necessary to test promising varieties, and very often one season will show you that for some reason or other a variety is not worth a second thought.

## RAINFALL TABLE.

The following figures, from data supplied by the Commonwealth Meteorological Department, show the rainfall for the month of and to the end of January, 1917, also the average precipitation to the end of January, and the average annual rainfall.

| Station. | For Jan., 1917. | To end Jan., 1917. | Av'ge. to end Jan. | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| **Far North and Upper North.** | | | | |
| Oodnadatta | 2·06 | 2·06 | 0·66 | 4·76 |
| Warrina | 1·29 | 1·29 | 0·28 | — |
| Tarcoola | 2·16 | 2·16 | 0·24 | 7·58 |
| Hergott | 1·06 | 1·06 | 0·46 | 6·04 |
| Farina | 1·04 | 1·04 | 0·52 | 6·70 |
| Leigh's Creek | 1·82 | 1·82 | 0·65 | 8·66 |
| Beltana | 2·50 | 2·50 | 0·70 | 9·22 |
| Blinman | 2·02 | 2·02 | 1·05 | 12·83 |
| Wilgena | — | — | 0·45 | — |
| Hookina | 4·80 | 4·80 | 0·27 | — |
| Hawker | 4·45 | 4·45 | 0·51 | 12·22 |
| Wilson | 3·54 | 3·54 | 0·59 | 11·78 |
| Gordon | 5·13 | 5·13 | 0·37 | 10·26 |
| Quorn | 3·24 | 3·24 | 0·59 | 13·78 |
| Port Augusta | 1·79 | 1·79 | 0·53 | 9·46 |
| Port Augusta W. | 1·97 | 1·97 | 0·47 | 9·36 |
| Bruce | 3·27 | 3·27 | 0·34 | 10·01 |
| Hammond | 2·89 | 2·89 | 0·61 | 11·46 |
| Wilmington | 3·39 | 3·39 | 0·81 | 18·26 |
| Willowie | 3·40 | 3·40 | 0·36 | 11·90 |
| Melrose | 4·17 | 4·17 | 1·25 | 23·04 |
| Booleroo Centre | 3·33 | 3·33 | 0·77 | 15·83 |
| Port Germein | 1·85 | 1·85 | 0·63 | 12·84 |
| Wirrabara | 2·65 | 2·65 | 0·64 | 18·91 |
| Appila | 2·26 | 2·26 | 0·61 | 15·08 |
| Cradock | 4·03 | 4·03 | 0·55 | 10·86 |
| Carrieton | 3·90 | 3·90 | 0·75 | 12·22 |
| Johnburg | 3·42 | 3·42 | 0·54 | 10·21 |
| Eurelia | 4·27 | 4·27 | 0·69 | 13·24 |
| Orroroo | 3·67 | 3·67 | 0·99 | 13·42 |
| Black Rock | 3·46 | 3·46 | 0·67 | 12·25 |
| Petersburg | 3·38 | 3·38 | 0·78 | 13·07 |
| Yongala | 3·52 | 3·52 | 0·61 | 13·94 |
| Oakden Hills | — | — | 0·42 | — |
| Coondambo | — | — | 0·65 | — |
| Wirraminna | 3·02 | 3·02 | 0·24 | — |
| **North-East.** | | | | |
| Ucolta | 2·72 | 2·72 | 0·59 | — |
| Nackara | 4·00 | 4·00 | — | — |
| Yunta | 3·42 | 3·42 | 0·65 | 8·22 |
| Waukaringa | 2·67 | 2·67 | 0·49 | 7·94 |
| Mannahill | 2·51 | 2·51 | 0·64 | 8·46 |
| Cockburn | 2·54 | 2·54 | 0·68 | 7·97 |
| Broken Hill, NSW | 3·54 | 3·54 | 0·69 | 9·63 |
| **Lower North.** | | | | |
| Port Pirie | 1·83 | 1·83 | 0·59 | 13·21 |
| Port Broughton | 0·57 | 0·57 | 0·64 | 14·33 |
| Bute | 0·60 | 0·60 | 0·65 | 15·42 |
| Laura | 1·69 | 1·69 | 0·70 | 18·22 |
| Caltowie | 1·64 | 1·64 | 0·66 | 17·27 |
| Jamestown | 1·63 | 1·63 | 0·64 | 17·46 |
| Gladstone | 1·40 | 1·40 | 0·64 | 16·00 |
| Crystal Brook | 1·34 | 1·34 | 0·62 | 15·62 |
| Georgetown | 1·80 | 1·80 | 0·64 | 18·32 |
| Narridy | 1·11 | 1·11 | 0·58 | 16·79 |

| Station. | For Jan., 1917. | To end Jan., 1917. | Av'ge. to end Jan. | 'Avge. Annual Rainfell |
|---|---|---|---|---|
| **Lower North—*continued.*** | | | | |
| Redhill | 1·86 | 1·86 | 0·53 | 16·79 |
| Spalding | 1·14 | 1·14 | 0·47 | 20·25 |
| Gulnare | 1·16 | 1·16 | 0·53 | 19·74 |
| Bundaleer W. Wks. | 1·33 | 1·33 | 0·43 | 17·29 |
| Yacka | 0·98 | 0·98 | 0·49 | 15·27 |
| Koolunga | 1·12 | 1·12 | 0·57 | 15·94 |
| Snowtown | 0·80 | 0·80 | 0·62 | 15·70 |
| Brinkworth | 1·27 | 1·27 | 0·35 | 15·48 |
| Blyth | 0·92 | 0·92 | 0·66 | 16·34 |
| Clare | 1·26 | 1·26 | 0·86 | 24·30 |
| Mintaro Central | 1·33 | 1·33 | 0·53 | 21·99 |
| Watervale | 1·77 | 1·77 | 0·88 | 27·17 |
| Auburn | 1·64 | 1·64 | 1·00 | 24·25 |
| Hoyleton | 1·52 | 1·52 | 0·77 | 17·96 |
| Balaklava | 0·49 | 0·49 | 0·70 | 16·03 |
| Port Wakefield | 1·57 | 1·57 | 0·56 | 13·13 |
| Terowie | 2·90 | 2·90 | 0.67 | 13·71 |
| Yarcowie | 2·64 | 2·64 | 0·67 | 13·91 |
| Hallett | 1·31 | 1·31 | 0·73 | 16·40 |
| Mount Bryan | 1·12 | 1·12 | 0·46 | 15·73 |
| Burra | 0·68 | 0·68 | 0·78 | 17·82 |
| Farrell's Flat | 0·50 | 0·50 | 0·78 | 18·87 |
| **West of Murray Range.** | | | | |
| Manoora | 1·16 | 1·16 | 0·54 | 18·09 |
| Saddleworth | 1·31 | 1·31 | 0·77 | 19·69 |
| Marrabel | 1·18 | 1·18 | 0·72 | 18·94 |
| Riverton | 1·88 | 1·88 | 0·73 | 20·48 |
| Tarlee | 0·51 | 0·51 | 0·79 | 17·48 |
| Stockport | 0·45 | 0·45 | 0·79 | 15·89 |
| Hamley Bridge | 0·54 | 0·54 | 0·82 | 16·45 |
| Kapunda | 0·75 | 0·75 | 0·86 | 19·67 |
| Freeling | 0·50 | 0·50 | 0·77 | 17·85 |
| Greenock | 0·60 | 0·60 | 0·76 | 21·46 |
| Truro | 0·94 | 0·94 | 0·74 | 19·74 |
| Stockwell | 0·78 | 0·78 | 0·73 | 20·30 |
| Nuriootpa | 0·85 | 0·85 | 0·78 | 21·25 |
| Angaston | 0·85 | 0·85 | 0·76 | 22·25 |
| Tanunda | 0·34 | 0·34 | 0·84 | 22·28 |
| Lyndoch | 0·68 | 0·68 | 0·74 | 23·01 |
| Williamstown | 0·64 | 0·64 | 0·90 | — |
| **Adelaide Plains.** | | | | |
| Mallala | 0·55 | 0·55 | 0·77 | 16·88 |
| Roseworthy | 0·76 | 0·76 | 0·75 | 17·31 |
| Gawler | 0·78 | 0·78 | 0·72 | 19·21 |
| Two Wells | 0·45 | 0·45 | 0·72 | 16·36 |
| Virginia | 0·42 | 0·42 | 0·75 | 17·58 |
| Smithfield | 0·61 | 0·61 | 0·50 | 17·30 |
| Salisbury | 0·36 | 0·36 | 0·74 | 18·57 |
| North Adelaide | 0·49 | 0·49 | 0·76 | 21·49 |
| Adelaide | 0·44 | 0·44 | 0·72 | 21·04 |
| Seaton (Grange) | 0·33 | 0·33 | — | — |
| Brighton | 0·34 | 0·34 | 0·58 | — |
| Glenelg | 0·38 | 0·38 | 0·63 | — |
| Magill | 0·48 | 0·48 | 0·83 | 19·93 |
| Unley | 0·50 | 0·50 | — | 18·35 |

## RAINFALL—*continued.*

| Station. | For Jan., 1917. | To end Jan., 1917. | Av'ge. to end Jan. | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| ADELAIDE PLAINS—*continued.* | | | | |
| Rose Park | 0·46 | 0·46 | — | 25·69 |
| Paradise | 0·46 | 0·46 | — | — |
| Glen Osmond | 0·52 | 0·52 | 1·00 | 25·26 |
| Mitcham | 0·45 | 0·45 | 0·85 | 23·47 |
| Belair | 0·50 | 0·50 | 1·00 | 28·64 |
| MOUNT LOFTY RANGES. | | | | |
| Teatree Gully | 0·46 | 0·46 | 0·78 | 28·19 |
| Stirling West | 1·06 | 1·06 | 1·49 | 46·70 |
| Uraidla | 0·94 | 0·94 | 1·30 | 44·35 |
| Clarendon | 0·46 | 0·46 | 1·13 | 33·67 |
| Morphett Vale | 0·25 | 0·25 | 0·82 | 23·32 |
| Noarlunga | 0·27 | 0·27 | 0·62 | 20·28 |
| Willunga | 0·36 | 0·36 | 0·75 | 25·98 |
| Aldinga | 0·16 | 0·16 | 0·54 | 20·34 |
| Myponga | 0·34 | 0·34 | — | — |
| Normanville | 0·31 | 0·31 | 0·57 | 20·65 |
| Yankalilla | 0·21 | 0·21 | 0·51 | 22·78 |
| Cape Jervis | 0·10 | 0·10 | 0·42 | 16·34 |
| Mount Pleasant | 0·69 | 0·69 | 0·81 | 26·87 |
| Blumberg | 0·49 | 0·49 | 1·12 | 29·38 |
| Gumeracha | 0·62 | 0·62 | 1·08 | 33·30 |
| Millbrook Reservr. | 0·64 | 0·64 | — | — |
| Lobethal | 0·60 | 0·60 | 1·02 | 35·38 |
| Woodside | 0·56 | 0·56 | 0·98 | 31·87 |
| Hahndorf | 0·28 | 0·28 | 1·05 | 35·45 |
| Nairne | 0·52 | 0·52 | 0·97 | 28·83 |
| Mount Barker | 0·62 | 0·62 | 1·02 | 30·93 |
| Echunga | 0·64 | 0·64 | 1·07 | 32·83 |
| Macclesfield | 0·67 | 0·67 | 0·88 | 30·72 |
| Meadows | 0·76 | 0·76 | 1·03 | 35·52 |
| Strathalbyn | 0·46 | 0·46 | 0·70 | 19·28 |
| MURRAY FLATS AND VALLEY. | | | | |
| Wellington | 0·37 | 0·37 | 0·80 | 15·01 |
| Milang | 0·32 | 0·32 | 0·67 | 16·08 |
| Langhorne's Brdg | 0·38 | 0·38 | 0·46 | 15·27 |
| Tailem Bend | 0·96 | 0·96 | 0·36 | — |
| Murray Bridge | 0·28 | 0·28 | 0·61 | 14·32 |
| Callington | 0·39 | 0·39 | 0·73 | 15·65 |
| Mannum | 0·58 | 0·58 | 0·53 | 11·67 |
| Palmer | 0·50 | 0·50 | 0·44 | 15·60 |
| Sedan | 0·82 | 0·82 | 0·53 | 11·92 |
| Swan Reach | 0·44 | 0·44 | 0·37 | — |
| Blanchetown | 0·32 | 0·32 | 0·55 | — |
| Eudunda | 0·50 | 0·50 | 0·75 | 10·71 |
| Sutherlands | 0·44 | 0·44 | 0·31 | 17·33 |
| Morgan | 0·42 | 0·42 | 0·49 | 10·60 |
| Waikerie | 0·55 | 0·55 | 0·24 | 9·29 |
| Overland Corner | 0·30 | 0·30 | 0·52 | 11·42 |
| Renmark | 0·54 | 0·54 | 0·45 | 10·93 |
| Loxton | 1·05 | 1·05 | — | — |
| WEST OF SPENCER'S GULF. | | | | |
| Eucla | 0·47 | 0·47 | 0·63 | 10·13 |
| White Well | 1·32 | 1·32 | 0·43 | 9·67 |
| Fowler's Bay | 0·75 | 0·75 | 0·40 | 12·11 |
| Penong | 0·98 | 0·98 | 0·26 | 11·93 |
| Murat Bay | 1·31 | 1·31 | 0·14 | — |
| Smoky Bay | 1·13 | 1·13 | — | — |
| Petina | 1·62 | 1·62 | 0·19 | — |
| Streaky Bay | 1·25 | 1·25 | 0·44 | 15·31 |

| Station. | For Jan, 1917. | To end Jan., 1917. | Av'ge. to end Jan. | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| WEST OF SPENCER'S GULF—*continued.* | | | | |
| Talia | 1·51 | 1·51 | — | — |
| Port Elliston | 0·65 | 0·65 | 0·37 | 16·49 |
| Cummins | 0·42 | 0·42 | — | — |
| Port Lincoln | 0·66 | 0·66 | 0·60 | 19·88 |
| Tumby Bay | 0·35 | 0·35 | 0·12 | 15·00 |
| Carrow | 0·69 | 0·69 | — | — |
| Arno Bay | 0 70 | 0·70 | 0·13 | — |
| Cowell | 1·15 | 1·15 | 0·41 | 11 76 |
| Point Lowly | 1·69 | 1·69 | 0·43 | 12·21 |
| Cleve | 0·95 | 0·95 | 0·43 | — |
| Hummock Hill | 2·24 | 2·24 | 0·32 | — |
| YORKE'S PENINSULA. | | | | |
| Wallaroo | 0·35 | 0·35 | 0·56 | 14·05 |
| Kadina | 0·29 | 0·29 | 0·52 | 15·88 |
| Moonta | 0·24 | 0·24 | 0·54 | 15·22 |
| Green's Plains | 0·45 | 0·45 | 0·51 | 15·73 |
| Maitland | 0·46 | 0·46 | 0·61 | 20·08 |
| Ardrossan | 0·42 | 0·42 | 0·52 | 13·89 |
| Port Victoria | 0·33 | 0·33 | 0·47 | 15·20 |
| Curramulka | 0 37 | 0·37 | 0·60 | 18·51 |
| Minlaton | 0·23 | 0·23 | 0·49 | 17·41 |
| Port Vincent | 0·28 | 0·28 | 0·43 | — |
| Stansbury | 0·11 | 0·11 | 0·61 | 17·06 |
| Warooka | 0·28 | 0·28 | 0·43 | 17·71 |
| Yorketown | 0·12 | 0·12 | 0·49 | 17·47 |
| Edithburgh | 0·17 | 0·17 | 0.51 | 16·48 |
| SOUTH AND SOUTH-EAST. | | | | |
| Cape Borda | 0·31 | 0·31 | 0·65 | 25·09 |
| Kingscote | 0·30 | 0·30 | 0·43 | 18·95 |
| Penneshaw | 0·15 | 0·15 | 0·62 | 21·34 |
| Cape Willoughby | 0·24 | 0·24 | 0·71 | 19·69 |
| Victor Harbor | 0·28 | 0·28 | 0·75 | 22·18 |
| Port Elliot | 0·31 | 0·31 | 0·68 | 20·33 |
| Goolwa | 0·35 | 0·35 | 0·66 | 17·93 |
| Pinnaroo | 0·66 | 0·66 | 0·32 | 16·74 |
| Parilla | 0·82 | 0·82 | — | — |
| Lameroo | 0·93 | 0·93 | 0·49 | 16·55 |
| Parrakie | 0·45 | 0·45 | 0·37 | — |
| Geranium | 0·39 | 0·39 | — | — |
| Peake | 0·63 | 0·63 | 0·47 | — |
| Cooke's Plains | 0·34 | 0·34 | 0·56 | 14·74 |
| Coomandook | 0·39 | 0·39 | 0·50 | — |
| Meningie | 0·28 | 0·28 | 0·66 | 17·49 |
| Coonalpyn | 0·33 | 0·33 | 0·72 | 16·80 |
| Tintinara | 0·41 | 0·41 | 0·48 | 18·78 |
| Keith | 0·35 | 0·35 | 0·33 | — |
| Bordertown | 0·88 | 0·88 | 0·76 | 19·76 |
| Wolseley | 0·40 | 0·40 | 0·57 | 17·72 |
| Frances | 0·78 | 0·78 | 0·70 | 20·74 |
| Naracoorte | 0·64 | 0·64 | 0·82 | 22·60 |
| Penola | 0·45 | 0·45 | 1·06 | 26·78 |
| Lucindale | 0·67 | 0·67 | 0·72 | 23·32 |
| Kingston | 0·40 | 0·40 | 0·73 | 24·73 |
| Robe | 0·57 | 0·51 | 0·78 | 24·69 |
| Beachport | 0·33 | 0·33 | 0·91 | 27·51 |
| Millicent | 0·40 | 0·40 | 0·99 | 29·25 |
| Mount Gambier | 0·46 | 0·46 | 1·43 | 32·00 |
| C. Nrthumberland | 0·28 | 0·28 | 0·88 | 26·63 |
| Kalangadoo | 0·57 | 0·57 | — | 18·87 |

# AGRICULTURAL BUREAU REPORTS.

## INDEX TO CURRENT ISSUE AND DATES OF MEETINGS.

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| Arden Vale & Wyacca | * | — | — |
| Arthurton | * | — | — |
| Balaklava | * | — | — |
| Beaufort | * | — | — |
| Beetaloo Valley | * | — | — |
| Belalie North | * | — | — |
| Berri | 579 | 7 | 7 |
| Blackheath | 592 | 3 | 3 |
| Blackwood | 580 | 19 | 19 |
| Blyth | * | 10 | 10 |
| Bookpurnong East | * | — | — |
| Booleroo Centre | * | 2 | 9 |
| Borrika | * | — | — |
| Bowhill | * | — | — |
| Brentwood | * | 1 | 8 |
| Brinkley | * | — | — |
| Bundaleer Springs | * | — | — |
| Burra | * | — | — |
| Bute | * | — | — |
| Butler | * | — | — |
| Caltowie | * | — | — |
| Canowie Belt | * | — | — |
| Carrieton | * | — | — |
| Carrow | * | — | — |
| Cherry Gardens | 592 | 6 | 6 |
| Clanfield | * | — | — |
| Clare | * | — | — |
| Clarendon | 592 | — | 5 |
| Claypan Bore | * | — | — |
| Colton | * | — | — |
| Coomandook | * | — | — |
| Coomooroo | * | — | — |
| Coonalpyn | * | — | — |
| Coonawarra | * | — | — |
| Coorabie | * | - | — |
| Cradock | * | — | — |
| Crystal Brook | * | — | — |
| Cummins | * | 10 | 10 |
| Cygnet River | 582 | 1 | 8 |
| Davenport | * | — | — |
| Dawson | * | — | — |
| Denial Bay | * | — | — |
| Dowlingville | * | — | — |
| Edillilie | * | — | — |
| Elbow Hill | * | — | — |
| Eurelia | * | — | — |
| Forest Range | * | — | — |

| Branch | Report on Page | Dates of Meetings. | |
|---|---|---|---|
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| Georgetown | * | — | — |
| Geranium | * | 24 | 31 |
| Gladstone | * | — | — |
| Glencoe | * | — | — |
| Glencope | * | — | — |
| Goode | * | — | — |
| Green Patch | * | | — |
| Gumeracha | * | — | — |
| Halidon | * | — | — |
| Hartley | 582 | 7 | 7 |
| Hawker | * | 6 | 6 |
| Hilltown | * | — | — |
| Hookina | * | 6 | 6 |
| Inman Valley | 583 | 8 | 8 |
| Ironbank | * | — | — |
| Julia | * | — | — |
| Kadina | * | — | — |
| Kalangadoo | * | 10 | 10 |
| Kanmantoo | 592 | 3 | 3 |
| Karoonda | * | — | — |
| Keith | * | — | — |
| Ki Ki | * | — | — |
| Kingscote | * | — | — |
| Kingston-on-Murray | * | — | — |
| Kongorong | 594 | 6 | 6 |
| Koonibba | 577 | 6 | 6 |
| Koppio | * | — | — |
| Kybybolite | * | 1 | 8 |
| Lameroo | * | — | — |
| Laura | * | — | — |
| Leighton | * | — | — |
| Lone Pine | * | — | — |
| Longwood | 584 | 3 | — |
| Loxton | * | — | — |
| Lucindale | * | — | — |
| Lyndoch | † | — | — |
| MacGillivray | 592 | — | — |
| Maitland | * | — | — |
| Mallala | * | 12 | 12 |
| Mangalo | * | — | — |
| Mantung | 579 | — | — |
| Meadows South | * | 6 | 6 |
| Meningie | * | — | — |
| Milang | 592 | — | — |
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| Miltalie | * | 3 | 3 |

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| Minlaton | * | 2 | 9 | Quorn | * | 3 | 3 |
| Minnipa | 578 | 10 | 10 | Ramco | * | — | — |
| Mintaro | * | 3 | 3 | Redhill | * | — | 6 |
| Mitchell | * | — | — | Renmark | * | — | — |
| Monarto South | * | | — | Riverton | * | — | — |
| Monteith | * | — | — | Roberts and Verran | * | — | — |
| Moonta | * | — | — | Rosenthal | * | — | — |
| Moorlands | * | — | — | Rosy Pine | * | — | — |
| Morchard | * | — | — | Saddleworth | * | — | — |
| Morgan | * | — | — | Salisbury | * | — | — |
| Morphett Vale | * | — | — | Salt Creek | * | — | — |
| Mount Barker | 587-8 | 7 | 7 | Sandalwood | 589 | — | — |
| Mount Bryan | * | — | — | Sherlock | 579 | — | — |
| Mount Bryan East | * | — | — | Spalding | * | — | — |
| Mount Compass | † | — | — | Stirling's Well | † | 3 | — |
| Mount Gambier | * | — | — | Stockport | * | — | — |
| Mount Hope | * | — | — | Strathalbyn | 591 | 6 | 6 |
| Mount Pleasant | * | — | — | Sutherlands | * | — | — |
| Mount Remarkable | * | — | — | Tantanoola | * | 1 | 1 |
| Mundalla | 592 | 14 | 14 | Tarcowie | * | — | 6 |
| Mundoora | * | — | — | Tatiara | † | — | 3 |
| Murray Bridge | 579 | — | — | Tintinarra | * | — | — |
| Mypolonga | * | — | 7 | Two Wells | * | — | — |
| Myponga | * | — | — | Uraidla and Summert'n | * | — | 5 |
| Myrla | * | — | — | Waikerie | 579-80 | — | 30 |
| McNamara Bore | * | — | — | Warcowie | * | — | — |
| Nantawarra | * | — | — | Warrow | * | — | — |
| Naracoorte | 593 | — | — | Watervale | * | — | — |
| Narridy | * | — | — | Wepowie | 577 | 3 | 3 |
| Narrung | * | — | — | Whyte-Yarcowie | * | — | — |
| Netherton | * | — | — | Wilkawatt | * | — | — |
| North Booborowie | * | — | — | Willowie | * | 6 | 6 |
| North Bundaleer | * | — | — | Wilmington | * | — | — |
| Northfield | * | 6 | 6 | Wirrabara | 577 | — | — |
| Orroroo | 576 | — | — | Wirrega | * | — | — |
| Parilla | * | 1 | 8 | Wollowa | * | — | — |
| Parilla Well | * | — | — | Woodleigh | * | — | — |
| Parrakie | * | — | — | Woodside | * | — | — |
| Paskeville | * | — | — | Wynarka | * | — | — |
| Penola | * | — | — | Yabmana | * | — | — |
| Penong | * | 10 | 10 | Yacka | * | — | — |
| Petina | * | — | — | Yadnarie | * | — | — |
| Pine Forest | * | — | — | Yallunda | * | — | — |
| Pinnaroo | * | — | — | Yaninee | * | — | — |
| Pompoota | † | — | — | Yeelanna | 578 | — | — |
| Port Broughton | * | — | — | Yongala Vale | * | 5 | 5 |
| Port Elliot | * | 17 | 17 | Yorketown | * | — | — |
| Port Germein | * | — | — | | | | |

*No report received during the month of January. † Formal report only received.
‡ Held over until next month.

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# ADVISORY BOARD OF AGRICULTURE.

## Dates of Meetings—February 14th, and March 14th, 1917.

# THE AGRICULTURAL BUREAU OF SOUTH AUSTRALIA.

**Every producer should be a member of the Agricultural Bureau. A postcard to the Department of Agriculture will bring information as to the name and address of the secretary of the nearest Branch.**

**If the nearest Branch is too far from the reader's home, the opportunity occurs to form a new one. Write to the department for fuller particulars concerning the work of this institution.**

# REPORTS OF BUREAU MEETINGS.

## UPPER-NORTH DISTRICT.

### (PETERSBURG AND NORTHWARD.)

### ORROROO (Average annual rainfall, 13.42in.).

December 9th.—Present: 14 members.

Drying Fruit.—The outfit required for fruit drying, remarked Mr. J. J. Dennis, in a paper on that subject, were trays, a bleacher, a good knife, a few boxes, an old bucket or half a kerosine tin, and a few pounds of sulphur. The tray could be made of laths or matchboard. He preferred the latter, because it was better to handle, and had fewer splinters. A handy size was 5ft. 6in. x 2ft. 9in., made with a narrow ledge around the top, and pieces about 1½in. wide at the ends, underneath, to keep the tray, when stacked, clear of the fruit in the tray underneath. The bleacher required a strong frame, 6ft. x 3ft. and 5ft. 6in. in height, with handles at the ends like a hand barrow. The frame should be covered with 1½in. netting, and then over all ruberoid. All joints should be air tight, and only the bottom open. The number of trays required could be ascertained by allowing two for each case of fruit, and it would be a week before the drying operations were completed, and the trays could be used again. In drying peaches, pears, and apricots, the fruit should be nicely ripe, but not at all over ripe, otherwise it became "squashy," and did not dry nicely. The fruit should be cut in half with a knife, the stones removed, and then laid skin downwards on the tray, but so that there was so overlapping. The trays should be stacked on two low boxes to the height of 10 or 12 trays. A few handfuls of sulphur should be put in a tin or bucket with some live coals and placed under the trays. The bleacher should be placed over the trays, and dirt heaped around the bottom to prevent the fumes escaping. After two and a half or three hours, the bleacher could be removed and the trays arranged side by side in the sun. They should be stacked up at night if at all damp. In about four days the fruit should be turned, an operation easily performed by two men with a spare tray and a couple of small jams, made to fit nicely over the edge on the trays when one was placed upside down on top of the other. As soon as that had been fixed the trays should be turned over, the jams and the top tray removed, and so on, until all had been treated. In a week, or perhaps less, the fruit might be fit to take in. It should be an amber color, just nice and tough, and not sticky or "squashy." Raisins and sultanas, as soon as gathered, should be placed in a wire bucket and dipped in a solution of boiling water and caustic soda (about 1¼lbs. of caustic soda to 18galls. of water). The berries should be left in until the skin commenced to show small cracks, when it should be tipped out on to the trays and put out to dry. After one and a half days they should be turned and left another two days, when they should be rubbed off the stems, cleaned, and boxed. The right time for packing away was when the berries felt nice and springy, and did not stick together. If sticky they should be placed in the sun for a few hours, and then stacked up to cool for a couple of hours, when they could be rubbed off the stems and boxed. Currants might be dried on wire netting frames (6ft. x 3ft.) made from 3in. x 1½in. timber and ½in. wire netting. Currants could also be dried on sheets of iron, because they required no other treatment than the sun drying. The berries should not be broken in picking or allowed to get dirty. If a wire tray were used turning would be unnecessary, but if a board tray were preferred it would be necessary to turn the currants just the same as other fruit. When thoroughly dry the berries would rub off the stems very easily. In large gardens a table shaped something like a trough was used with ½in. wire netting along the bottom. Boxes were placed underneath, and the currants rubbed into them. In small gardens they were rubbed by hand on a tarpaulin and winnowed through an ordinary wheat winnower with a ⅜in. mesh sieve. That blew away the stems and graded out the big berries.

WEPOWIE, December 16th.—An address was given by Mr. J. Crocker on methods of harvesting, in which he advocated the use of the harvester where the cocky chaff was not required, but he preferred the stripper in the North. A light windmill could be constructed to turn the winnower. He preferred obtaining a new comb for the stripper to having the old one closed, because the latter always lost wheat. In the discussion which ensued, members expressed a preference for the harvester. Mr. F. Roocke said that, in the paddock where he cut for heading last year, he had during the present year secured a good crop of self-sown hay, a proof, he thought, that much wheat was wasted in heading.

## MIDDLE-NORTH DISTRICT.

### (PETERSBURG TO FARRELL'S FLAT.)

WIRRABARA, December 9th.—Mr. F. C. Carson read a paper on the use and value of the roller, and said that the roller should always work in front of the drill in order to press the ground and level it so that all the seed might be sown to the same depth. When the wheat was from 6in. to 12in., or even 15in. high, it should be rolled, because the roller took with it some of the flag, which acted like pruning to the plant. It also destroyed grubs. After rolling it was possible to cut much lower with the binder, thus securing more hay, and doing less damage to the binder knives. Whether the land was light or heavy rollers could do very profitable work in preparing land for wheat, especially land broken up late in the season. All land intended for wheat, and broken up after July rains should be heavily rolled as soon after ploughing as possible, and the beneficial result could be measured in bushels at harvest.

## LOWER-NORTH DISTRICT.

### (ADELAIDE TO FARRELL'S FLAT.)

FREELING, November 9th.—A paper was read by Mr. G. E. Roberts on harvesting machinery, and the discussion which ensued related to the merits and shortcomings of various makes of harvesters and the relative merits of harvesters and strippers, and winnowers.

## WESTERN DISTRICT.

KOONIBBA, January 4th.—Mr. M. J. Foggo read a paper on the cultivation of the soil for wheatgrowing in that district. He urged ploughing to a depth of 3in. and then the ground should be harrowed as much as possible, especially after rain. As much land as possible should be fallowed early in June or July, while the ground was wet. If weeds appeared a tine cultivator should be used. In the discussion which followed some members contended that fallow was not as successful in that district as had been claimed in other districts, because the land always drifted badly, no matter how or when ploughed. In the present season fallow land was giving no better results than land which had been ploughed just before seeding. Other members claimed that fallow had proved most successful.

YEELANNA, January 13th.—Mr. T. A. Proctor read a paper entitled "Poultry on the Farm," in which he urged the necessity for proper attention to the housing, feeding, and breeding of fowls. Farmers sometimes purchased a stock of fowls, which, in new quarters with a good run and all the natural herbage and food they required, did well, but from lack of care and management and in-breeding, they deteriorated, and became weaklings, among which disease broke out and did great damage. In such cases a fresh start should be made, and with proper attention the poultry would pay. Members generally agreed with the views contained in the paper, a preference being expressed for the white Leghorn, because of its splendid laying qualities.

MINNIPA, December 9th.—Mr. G. V. Lindquist delivered a short address on fire breaks, in which he advised clearing a half-chain break for scrub and a quarter-chain for stubble, ploughing a furrow each side of the break, and burning the intervening grass or stubble. Breaks should be made around wheat heaps and stacks by removing the loose straw and litter with a horserake. Mr. A. J. Godlee recommended the employment of many hands when burning scrub. Whirlwinds were of frequent occurrence when a south-east breeze was blowing. Mr. J. M. Casey expressed the opinion that the shovel was the best implement for extinguishing fires. Mr. S. C. North advised burning breaks at the end of winter, before the crops came into ear. Mr. Elefson said that Mr. North's suggestion entailed too much work. It was important to have a north wind for scrub burning.

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## EASTERN DISTRICT.

### EAST OF MOUNT LOFTY RANGES.)

### MINDARIE.

November 20th.—Present: nine members.

**Rotation of Crops and Hand Feeding of Stock.**—The two subjects, the rotation of crops and hand feeding of stock, had been dealt with together, remarked Mr. J. S. Johnston in an interesting paper, because they were partly dependent on each other for success. To grow wheat successfully, he continued, a farmer must, after the first two or three crops, adopt some other rotation crop, and have stock. It was best to grow a crop of different feeding habits, and a crop that would starve out takeall. The only crop which could be sown over a large area was oats. A system practised at Pinnaroo, and to his mind, the best, was to crop with wheat the first year, oats the second year, bare fallow the third year, and continue that rotation. In most cases it was only necessary to drill the oats in with about 25lbs. or 30lbs. of super. In the system indicated two-thirds of the farm were under crop, and one-third under fallow. That kept the land clean and free from takeall, and good burning off was obtainable where necessary. Where the country was light and of a very sandy nature, oats were practically the only means a mallee farmer had of getting a good burn, and ridding his farm of shoots, because wheat would only grow thinly on sand, and had very little flag. To some it was a problem what to do with all the oats grown under that system, because there was only a limited market for them. Oats, however, made an excellent sheep feed, fattening them, and causing a fine growth of wool. That solved the difficulty of the disposal of the oats. It had been demonstrated that 1lb. of hay or straw chaff, with a little oats, or 2lbs. of oaten chaff per day was quite sufficient for a sheep to thrive on and grow a good fleece. On that basis 170 tons of hay chaff with oats would keep 1,000 sheep, if hand fed all the year round, but it was not probable that it would be necessary for so long a period. For fully three months of the year the sheep would be grazing down the fallow and living on the stubble, and therefore the hay, chaff, and oats required would be considerably—approximately 25 per cent—less than 170 tons. Where the land was heavy sand he would not harvest the oats, but would turn the sheep on them and save hauling the machinery. He would strip the oats he required for grain into heaps, and cover over with straw until wanted, thus saving bags and cleaning. He would save all cocky chaff from the wheat to mix with the oats to provide bulk. Some of the oats and wheaten straw could be cut for hay. By adopting that system the number of sheep in the State could be almost doubled. An ordinary mallee farm would keep 600 sheep (a low estimate for hand feeding). At the present time they would cut 10s. worth of wool, and produce, say, 80 per cent. of lambs at £1 per head, thus giving a return of £780 from that flock. To keep more sheep still, if the labor were available, the wheat could be cut and headed, and the straw used for feeding stock. Wheat should be grown only on well-worked fallow, and oats for feeding stock on the stubble. The poultry yard should pay household expenses and a little over, and a few pigs should be kept. In fact, most of the produce should walk off the farm, thus overcoming long distance carting and heavy roads. The only difficulty was financing the start, but with that accomplished the road to success, on those lines, was assured. Mr. R. Shannon considered that new land might successfully carry two crops of wheat and one or two of oats, in succession, but a third crop of wheat would be too much. Mr. J. W. G. Mann said that his land, which had produced oats the previous year was not producing anything like the crop which land alongside, on which wheat was grown the previous year, was producing. Mr. R. C. Payne considered oat growing indispensable to successful farming in the mallee. In his opinion 50lbs. to 60lbs. of super. should be used. Mr. E. L. Parker declared that the soil in that district would not stand well-worked fallow. He advocated shallow ploughing, not more than 2in. in depth, and then left until seed time. He would not work the sandhills. Mr. M. A. Francis believed in sowing fodder crops and feeding them off with sheep because of the enrichment of the soil that resulted.

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BERRI, January 3rd.—Mr. W. R. Lewis read a paper on fruit drying, which was discussed extensively. The cup presented by the Branch for the best-kept orchard was awarded to Messrs. Pennyfield Bros., who scored 84 points out of 100. Mr. B. Arndt was second, with a score of 80, and Mr. B. Kurtz third with a score of 78. The marks were apportioned as follows:—Lay out, 15; pruning, 25; ploughing, 10; cultivation and irrigation 30; growth and appearance 15; general neatness in care of harness, fowlhouses, flower or vegetable garden, 5. There were 21 competitors. The principal failing was in cultivation.

MANTUNG, December 7th.—Mr. W. Stewart introduced a discussion on the stripper. He raised the question as to the height the beaters should be from the comb. Mr. Hammond said that he had secured good results from fixing the beaters ¾in. from the comb, and 1in. from the thrashing plate. Mr. G. N. Baker said that it was merely a matter of opinions and machines; different machines requiring different setting of the beaters. Mr. H. W. Lehmann considered that the man driving the stripper should experiment. If the machine was cutting cleanly and thrashing well it was best to leave it as it was. If the beaters did not cut the head off they should be set down a trifle, but not low enough to cause them to "knock." An aid to thrashing was to insert a row of horseshoe nails just above the thrashing plate.

MURRAY BRIDGE, December 7th.—Mr. F. E. Place, the Government Veterinary Expert, delivered an address entitled "Udder Ills of Cows," and was accorded a hearty vote of thanks. On November 11th a visit was paid to Mount Barker, and members were shown the process of leather making at Messrs. T. Paltridge & Son's tannery. Subsequently they were conducted over Messrs. Pope Bros.' farm on the Echunga Road, where a considerable time was spent, and lunch was served. The next halting place was "Dalebank," Mr. Leslie Cowan's residence, at Blakiston, where the Jersey herd was inspected. Afternoon tea was served, and the party then returned home.

SHERLOCK, December 30th.—After the business of the annual meeting Mr. T. Partridge read an article by Mr. A. V. Richardson (Victorian Superintendent of Agriculture). Mr. R. F. Mayfield also read a paper.

WAIKERIE, December 15th.—Mr. V. S. Brown read a paper on marketing fresh fruit, and pointed out that river growers could not expect the best returns under existing conditions. Cool cars were not provided on the Waikerie line. Fruit was all day on the journey, and consignees could not obtain delivery until the following morning. Mr. Ross emphasized the necessity for consignees of fresh fruit securing delivery the same evening on which it arrived in the city.

WAIKERIE, January 5th.—Mr. A. G. Ifould read a paper on dairying, in which he urged the necessity for selecting a good milking strain, a pure-bred bull being the essential foundation of the herd. All cows should be tested, and the unprofitable ones sent to the butcher. He preferred the milking Shorthorn crossed with the Jersey or Ayrshire. Cleanliness was imperative. In the discussion which ensued some members declared that dairying was unprofitable unless child labor was employed. Others held that at present prices for butter a suitable system of irrigation for growing lucerne combined with dairying, pig raising, and a small fruit garden would pay a family man.

## SOUTH AND HILLS DISTRICT.

### BLACKWOOD (Average annual rainfall, 27in. to 29in.).

December 18th.—Present: 12 members.

FIRE BLIGHT.—Mr. C. G. Savage, manager of the State Experimental Orchard, read a paper on fire blight, as follows:—"The term 'fire blight' as commonly applied in this State covers many diseases and disorders; in fact, wherever a tree becomes defoliated or the leaves dry during the growing period, no matter from what cause, the trouble is termed 'fire blight' by many orchardists. The main cause of the trouble of what is more accurately termed fire blight in this State is due to the 'shot hole' fungi mainly (*Clasterosporium carpophilum*). At times growers are apt to question this statement, because, on reading American literature, 'fire blight' is found to be caused by a bacteria (*Bacillus amylovorus*, Burl.), and not by a fungus. A short note on this disease may be of interest, as it is one of the worst enemies with which growers of pears have to contend. The disease becomes such a scourge that the importation of pear trees from the United States of America into the Commonwealth is absolutely prohibited to prevent the introduction of the disease into this country. The disease may be confined to one or two limbs, or may spread through the whole tree. The affected portion soon dies and blackens, rifts occur in the bark through which gum exudes, carrying with it the germs of the trouble. Insects are attracted by the gum, and by the means of these busy creatures the germs are carried away to the opening pear blossoms, where they rapidly grow and multiply in the nectar of the flowers. Infection of the tree takes place by the disease entering through the flower, down the flower stalk, and then to the tender shoots of the tree; or germs may be blown by the wind on to the young shoots, and the tree soon becomes diseased. The spread of the trouble varies with the season, and, as in the case of fungi, the disease is worse in a damp spring than in a dry one, but after the germs become deeply seated in the tissues of the tree the rainfall has not so much influence upon its growth as the temperature. There are three main points of attack, viz., flower, opening leaf buds, and any exposed tissue upon the stem or limbs. Hence there have arisen many forms of 'fire blight' such as 'flower blight,' 'leaf blight,' and 'body blight,' but all are caused by the same organism, the only difference being the place of attack. When the disease attacks the apple tree, the infection usually takes place through the flower, but does not make much progress, only a few inches of the lateral bearing the flowers being destroyed. Sometimes the whole crop is lost, but usually only a thinning of the fruit takes place. The germ is very small, and is supplied with a whiplash-like mobile organ by means of which it can move. There is no definite remedy for controlling this 'fire blight,' the usual practice being to cut the affected portion of the tree well below the diseased area, and to burn the cuttings. The life history of the 'shothole fungus' (*Clasterosporium carpophilum*) is somewhat as follows:—The spores are scattered over the trees, and germinate as soon as sufficient moisture has fallen to wet them through. That usually takes place in the early autumn. Spores lying on the tender bark of the new wood germinate and penetrate into the young tissue, causing characteristic spotting by the mycelium of each spore killing a small area of bark. The spores lying on the bud scales send their mycelium into the bud, and generally kill it as well as the surrounding tissue, which becomes covered with a gummy exudation. When the buds, which have survived the autumn attack, open in the spring the young leaves arising therefrom soon show the characteristic brown spots. The affected areas dry up and fall, leaving the 'shothole-like' perforations in the foliage so familiar to all growers of stone fruit. The spread of the disease is usually arrested as the warmer weather sets in, but, when rain continues to fall during the early summer months, as has been the case this season, the spores produced during the spring germinate and great damage is done to both fruit and tree. In many cases practically the whole of the tree is defoliated, the crop lost, and, the trees being seriously weakened, sometimes die. That has been the case with cherry trees in many parts of the hills during the present year. Seeing that infection takes place during the autumn and again in spring, the time to spray to successfully combat the disease is apparent. Professor Ralph E. Smith carried out experiments in 1906 in Californian peach orchards covering some 2,500 acres with very gratifying results. The fungicide used was mainly Bordeaux mixture, made in the proportions of 30lbs. bluestone and 35lbs. quick lime to 200 galls. of water. The results of those tests showed that the shothole or peach blight was effectively controlled where the trees were sprayed in October, November, and December (equivalent to our April, May, and June). Where the trees were sprayed in the early spring time only the curl leaf fungus was checked, but the shothole fungus was not affected; consequently he recommended two sprayings, one in the early autumn to control the shothole, and one in the early spring to check the leaf curl. Where possible early pruning is advocated, as the spraying of the trees is made much easier, but the spraying should not be delayed to finish the pruning, otherwise the season for successfully dealing with the disease may pass. Bordeaux mixture is not the only fungicide that can be used against this trouble, as any reliable spray recommended for this type of disease should give satisfactory results. Burgundy mixture (bluestone and soda) has given the best results in our local tests against the leaf curl fungus, and is more easily applied than the Bordeaux mixture. It is interesting to note here that in a publication 'Insect and Fungus Pests of the Orchard and Farm,' by A. M. Lea, F.E.S., &c., issued by the Council of Agriculture, Tasmania, the fungus disease (*Podosphaera oxyacantha*) which sometimes is very destructive to nursery stock and to the young shoots of bearing apple trees, especially New Yorks (Cleopatra) and Stone Pippins, is termed powdery mildew, or 'fire blight.' The cabbage aphis (*Aphis brassicac*).—This insect often plays havoc with cruciferous plants during the summer and autumn months. It is of a dull greenish color, but is covered with greyish mealy substance, which is easily rubbed off. It usually occurs on patches on the leaves, and the soil beneath the attacked plant often becomes greyish with the secretions given off by the insects. When badly affected, the plants have a very disagreeable odor, which can be detected some distance away. Thousands of specimens may be observed on a single leaf, and reproduction is so rapid that were it not for useful insects, which keep them in check, the growing of cabbages and cauliflowers would be a difficult task. The most useful of these insects is a small ichneumon fly. When attacked by this fly the aphides lose their soft downy appearance, and turn to a dark straw color and become somewhat shiny. When examined closely, a small hole in the body of the aphis may be seen through which the parasite has escaped. The best preventive against infection is to keep the plants growing rapidly, because stunted plants are more liable to attack. The application of manures to the soil before planting, and the watering in of small quantities of nitrate of soda, sulphate of ammonia, and soot as the cabbages are commencing to heart will force the plants on and thus aid in preventing attack. The spraying with water at 120deg. Fahr. is recommended where the aphides have become established. Pour boiling water into the spray tank, and by the time it is sprayed on to the plants it will not be too hot, and will not injure the cabbage leaves, since the thick fleshy nature of the leaves enables them to withstand considerable heat with very little damage. Spraying with tobacco wash, resin wash, or kerosine emulsion will destroy the insects, but these applications should be applied before the cabbages begin to heart, otherwise the vegetables may become tainted. As many of the plants become infested while still in the seed bed, it is advisable to immerse the young plants in one of the above spray mixtures when transplanting.'' Mr. J. Turner had found that cabbages inclined to be a little open were more often attacked by the aphis than those of the solid heart type, and recommended Drumhead and Brunswick varieties for summer growing. He had checked the pest by applying water and wood ashes to the affected plants. Mr. P. H. Williams did not favor spraying, but preferred to water freely to keep the cabbages growing fast in order that the plants should not be checked in their growth.

Grading Fruit.—In reply to the question, "Is it worth while to grade fruit for sale in South Australia Mr. G. W. Summers stated that the graded fruit always commanded the best price, because the buyer based his price upon the smallest fruit he saw in the case. When dealing with the question "Whether the growers of this district could by co-operating and grading the fruit obtain more satisfactory results by obtaining orders, and delivering the fruit direct to the consumer," he said if the whole crop could be disposed of in that way it would pay, but if part only were dealt with the packers would refuse to take the remainder. There would be a greater consumption of fruit by selling at a fair price by the case than there was now with the hawker selling out the produce in one or two-pint lots. There was too great a difference between the grower's price and the hawker's price. If the hawker sold at a smaller profit more fruit would be disposed of. The only way would be to establish a central depot. Mr. Ashby contended that there was no fear of being boycotted by the buyers, who would come to where they could buy reliable fruit. A great deal could be done by co-operating and putting up the fruit in small packages and getting the retail shops, other than fruit shops, to act as the vendors. By these means the fruit could be placed within reach of the consumers in a form and at a price which they have never previously experienced. To deal with apples and pears in that way was a simple matter, but the handling of soft fruits presented more difficulties, which might, however, be easily overcome.

At a meeting held on January 15th Mr. F. E. Place, the Government Veterinary Lecturer, read a paper entitled "Some Common Ailments of Cows," and afterwards answered a number of questions.

## CYGNET RIVER.

January 4th.—Present: nine members.

Side Lines on the Farm.—Dealing with small holdings of 50 or 100 acres in extent, Mr. F. J. Wakelin, in a paper on side lines on the farm, said that on such an area a living could not be obtained from cereals, but sheep were profitable if hand fed, and every farmer should have a few, if only to breed from. The first move would be to enclose 25 or 50 acres with a sheep proof fence and divide it into two paddocks, so that the sheep could be changed from one paddock to another. If the grazing were fairly good, 50 sheep would do well on such an area for three months without any hand feeding. During the rest of the year hand feeding would be necessary. Good oaten chaff was the cheapest food, and the sheep did well on it. Poultry was another profitable line if given proper attention. The best laying hens should be selected and penned up for breeding purposes. No other than the best should be bred from. It was better to keep 20 good laying hens than 50 old hens running about the yard scratching out feed and hay and eating their heads off. Laying hens should not be overfed, but should be made to do plenty of scratching for their food. Mr. H. T. Noske urged that there was more profit in sheep at the present time than when they could be purchased at one-fourth the present price. Mr. N. Brennand considered that a few sheep should be kept on every farm, but it was essential to fence before commencing.

## HARTLEY (Average annual rainfall, 15in. to 16in.).

December 6th.—Present: 12 members.

Manures.—By way of preface to a paper on the subject of manures Mr. S. Beavis dealt with the question of plant growth and then, in regard to manures, mentioned that calcareous substances such as lime, shells, and gypsum not only had a mechanical effect on the soil, but also supplied elements necessary as plant food. One of the constituents which frequently needed to be supplied to plants in manure was phosphoric acid. That was supplied by quite a number of phosphatic manures, and one of the most valuable was bones, either ground or crushed into a powder or meal. Bones were often dissolved in sulphuric acid, by which means the phosphate of lime became soluble in water, and thus supplied plant food immediately to the soil. Common manure consisted of the remains of organised bodies of every description, whether animal or vegetable, in a state of decomposition, *i.e.*, resolving themselves into those elements which could re-enter into the vegetable system. Manure, which had not completely undergone the process of fermentation so that the straw was not wholly decomposed, was best adapted to strong compact soils, rendering the soil lighter, and on the completion of the fermentation of the straws, etc., the temperature of the soil was very considerably raised. Those substances which were subject to the most rapid decomposition were specially valuable for manure—they were animal manures, which require no chemical preparation to fit them for the soil. The farmer, however, should have some knowledge of how to blend them in order to prevent their too rapid fermentation. Reference was then made to various substances which were used as manure in parts of the more thickly populated countries.

A Few Hints on the Farm.—Mr. W. Bermingham read a paper entitled a few hints on the farm, in which he declared that it was a mistake to use long-pointed shares in the stiff, stony land in that district, because the plough had to jump so high that it missed too much ground. The short T shares were better, and they were better still when an inch or so had worn off them and they had been sharpened up again, which should be done by the farmer himself, because no one knew how a thing should be done better than the user. A paddock on the side of a hill should be ploughed up and down, because much more was done than if ploughed the other, since the plough was always running on an angle, and that meant taking less than a full furrow. It was contended that ploughing across the hill was easier for the horses, but that was doubtful, because any implement running at an angle was not pulling easily. After being ploughed the ground should be cultivated or harrowed crossways at once to keep the water from running off. What was desired was that every drop of rain should be absorbed where it dropped. That was impossible in some places, but more could be done in that respect. Water running over the land did no good. It set the soil down tightly, and that was not what was required. When harrowing after the drill, it was best to harrow with a view to stopping the water from running, because in trickling down the harrow tine marks it would soon wash out little creeks. The same thing applied to the grass paddocks. Tons of water ran into the creeks which could be kept on the grass by a little foresight. Much could be done with a shovel by turning the tricklings off in different places and putting a good coat of stable manure across the little gullies, or super. might be drilled in with a hoe drill. That would make a good coat of grass which would hold the water fairly, and pay well for the super. used.

## INMAN VALLEY (Average annual rainfall, 26in. to 27in.).

January 11th.—Present: 14 members.

Dairying.—"First of all ascertain if the land is suitable to dairying," advised Mr. E. Hutchinson in a paper on dairying, or, he continued, the result would be failure and loss. Second and third class land should be avoided, the guiding principle being the best cows on the best land. An 80-acre section should carry 10 cows, or eight acres to the cow, with a horse or two for general purposes. Each cow should average 260lbs. of butter per annum, which at 1s. per lb. equalled £13 per cow. Cows should be yarded for milking in an enclosure having a post and rail fence, the size depending on the number of cows dealt with. No barbed wire should under any circumstances be used on a dairy farm. Bails and leg ropes should be used according to the temperament of the cows. The bail should be 10ft. x 5ft., and 6ft. 6in. in height, with a slab or stone flooring. A dish of clean water and soap should be provided to wash the milker's hands and the cow's udder, and a shovel should be kept to remove any droppings at once. The milking should be done at regular hours, twice a day, except during the drying off process. Cows should be yarded at least 15 minutes before milking, and should never be driven with a dog. Animals which were difficult to milk or had lost a quarter should be dried off and fattened for the butcher. Three months before calving the cow should be dried off. Twelve hours after the calf had been dropped it should be separated from the mother and tied up so that she could see it, for a week, and then removed, if necessary. Generally the milk from the cow should not be used until the fourth day after calving, but in the case of a heifer it should be six days. At eight years the best had been got from a cow, though they would sometimes last until 12 or 14 years. In that district during the cold winter months there was a considerable decrease in the cow's butter yield, and therefore shelter should be provided in the shape of a shed, pine trees, a straw stack, or scrub lands. In feeding cows, if water were plentiful, lucerne should be available from February 1st to May 1st, but otherwise a ration of bran and chaff (20lbs. of chaff and one gallon of bran mixed with water) should be supplied twice daily. From May 1st to August 1st green feed should be supplied. A pure Ayrshire bull should be secured at a cost of from 30 to 40 guineas, but it was inadvisable to stint money in procuring a good animal. Each cow should be tested, and none but the best kept. Several members condemned the suggestion that the calf should be allowed to remain in sight of the newly-calved cow. It was contended that the sooner the calf was placed out of sight and hearing the sooner the mother forgot it.

### LONGWOOD (Average annual rainfall, 37in. to 38in.).

January 6th.—Present: 10 members and four visitors.

Potato Culture.—After tracing the history of the potato and its introduction to England and Ireland, Mr. Joseph Johnson, in an informative paper, dealt with its cultivation. Firstly, he insisted upon the necessity for having the land in good condition before planting.. The beds should also be harrowed when the potatoes were coming up, which would assist in destroying the weeds and render hand hoeing almost unnecessary. The distance between setts was important. Pinkeyes, Up-to-dates, Carmens No. 1, and Excelsior rows should be from 22in. to 24in. apart x 1ft. Snowflakes, Prolifics, and Carmens No. 2 required more room. Space and ventilation were required in potato growing. That was demonstrated by the fact that where a sett missed the roots on either side were usually the best. Early planting in a wet season, such as the present, should be as shallow as possible, not more than three or four inches, but later in the season it should be four or five inches, but at any time the planting should be rather shallow than deep. Deep planting frequently caused irregular crops. The best potatoes were always found near the surface, a fact which indicated that deep planting was not required. Cut setts always gave the best results for spring planting, and the size depended upon the number of eyes. A sett of about 2in. was sufficient and two good eyes were ample. In some varieties, one eye, if well shot, was sufficient. If seed were not ready to plant, it should be kept out of the ground until it was ready, with the result that the crop would mature earlier and probably better. Round seed from a poor crop should never be planted, and seed continually saved from round could not give good results. At all times, a change of seed was desirable, and, if possible, imported seed should be used. He would like to emphasise that there was a great difference between seed potatoes and potato seed. Seed potatoes were those saved from potatoes which had grown in the land, but potato seed was found in the tops, but only in beds which had bloomed well, under favorable conditions. It was from that seed that new varieties were obtained. Much time was required to raise plants from seeds, but they usually possessed more vigor, greater yielding powers, and were less liable to disease than varieties grown from the same tubers for many years. Varieties tended to deteriorate, and although the deterioration was greatly retarded by frequent change of seed and good cultivation, it was advisable to constantly experiment with new varieties. In favorable seasons, on good potato soil, well tilled and manured, crops of 12 to 16 tons per acre might be grown. Early potatoes were more liable to disease than those grown later, but spraying at the proper time had proved to be a preventive of disease. Potatoes would grow anywhere, but were more prone to contract disease in stiff than in light soil. The most prolific varieties for early planting were Manistee, Bismarck, Up-to-date, Carmen No. 1, Pinkeyes, Scottish Triumphs, and Excelsiors. For late planting, Up-to-dates, Snowflakes, Sussex, Wellington, White Prolific, and Carmen No. 2 were best. He emphasised the necessity for greater care with seed before planting. Seed should be obtained a month or two before planting and placed on trays or lofts with plenty of ventilation. Galvanized iron cases made good trays. The bottom boards should be removed, and a sufficient number replaced to allow a free passage of air. The trays could be stacked one on top of the other, but in such a way as to allow plenty of room between. Seed given plenty of ventilation and allowed to harden before planting would become more healthy, and was less liable to rot or take disease when planted, whether the season was wet or dry. Seed saved from a crop dug just before it was fully matured would yield better results than those left in the soil after the tops had dried off. In taking seed out to plant, boxes should be used, because in that way the shoots were saved and heavier crops obtained. The manure required depended upon the crop previously grown on the land. Where cabbage, cauliflower, lettuce, peas, and such like had been grown to perfection, very little manure would be necessary, but it would always pay to give a light dressing of potato manure. If the land was not rich, up to 10cwts. per acre of such manure might be given. There was, of course, nothing like stable manure. Most of the land was deficient in lime, and if lime were applied it should be done when the land was being prepared for planting, and not at the time of planting. Drainage was an important factor in the production of good potatoes. Where the land was not of a porous nature artificial drainage, that was underground drains, should be constructed. Ploughed furrows were too shallow for drainage. The drains should be 3ft. or 4ft. deep. Clay pipes were best, but rather expensive. He had found that slabs 18in. in length made excellent drains. Discussion ensued, in which it was stated that the first essential to success was the thorough and deep working of the soil. Stable manure might be ploughed in, but artificial manures were best if spread on the surface after planting and harrowed in. Eight hundredweight of potato manure was equal to 10cwts. of bonedust per acre. If potatoes were planted on hillsides nitrogenous manures should be used. From potato seeds it required three seasons to obtain results. From 50 seeds one or two good sorts might be obtained.

Orchards and Orchard Work.—Mr. C. H. Beaumont's second paper on orchards and orchard work was read as follows:—In regard to drainage, I recommend that a plan of the intended orchard should be prepared, and one of the uses that the plan can be put to is the placing of the drain pipes. If the plan is drawn as it should be, on a sheet of strong paper with a linen back, set out with a good set and T square, and inked in with Indian ink, and, of course, drawn to scale, there would be no difficulty in deciding on the proper course for the drains. I have but little to say about surface drains for flood waters. Flood waters, from outside, will be prevented from entering the orchard by being diverted, and if it is necessary, flood waters within the orchard must be prepared for by digging a trench large enough to more than carry the water. Those trenches should be lined with stone. The "drainage" I want to emphasise is the soil drainage, by which surplus water in the soil is removed by the drains, instead of having to wait until it is evaporated. Drainage prevents a stagnation of soil water, which means avoidance of the exhaustion of the oxygen from the air in the soil water, and in the spaces in the soil not occupied by water. It is an acknowledged fact that abundance of free oxygen in the soil is a fundamental necessity to plant life, and thorough drainage secures this. There are several effects arising from drainage, which help materially in getting healthy trees, viz., the soil is better ventilated, because it is more open; it is warmer, because the rain is always warmer than the soil, and it carries the heat down with it. The drained soil to a depth of 12in. is 5deg. to 6deg. warmer than undrained, and this means a lot in the winter months, because the growing season is lengthened and the soil can be better cultivated. The available soil moisture is increased, because the roots can go deeper than in undrained soils. We can go on to drained land almost at once after heavy rains, without puddling the soil. Trees require a moist soil, but cannot grow well in a wet one. The water which makes a soil moist is that which adheres to the individual soil particles, in the shape of a thin film, which entirely fills only the smaller spaces between the particles. This kind of water is called capillary, and will move in any direction by capillary attraction, and plants probably depend entirely on this for their supply, and its maintenance is of the greatest importance. A wet soil is caused by gravitational water, which moves in one direction, downwards, and which must be removed, or the trees cannot do well. The roots of the trees require air, just as do the parts above ground, and if all the space is filled with water, air cannot exist there, nor can the bacteria which live in the leguminous plants get their nitrogen; hence, again, is demonstrated the necessity for thorough ventilation. Drained soils dry deeper, and the roots will go down to greater depths. Apple roots have been found 9ft., grapes 6ft., raspberries 5ft., strawberries 22in., and in lucerne 174 days old roots were down 4ft. In wet soils, as all know, trees are invariably shallow rooted, and are easily damaged in the process of cultivation, and especially if a dry spell sets in. Make sure of this fact—drainage does not rob the soil of necessary water; it helps to conserve that, but it gets rid of excess or surplus water, which would drown the trees' roots by causing the soil to become waterlogged. Some will probably say, "What about the cost; how are we to pay?" That I cannot enter into in this paper. What I am setting out to do is to demonstrate the best way and the most payable way to start an orchard, and I can prove that drained lands are the most payable. And now, how to go about the construction of the drains. The first thing to do is to fix on the outlets, one or many, according to the land. A creek bank is, of course, the ideal; otherwise start from the lowest spot or spots, and mark out on the plan the system it is intended to install. The drains should be between the rows of trees. For fine or clayey soils, the depth of the drain should be 30in., and the distance between about 40ft. For porous sandy or free soils, the depth should be 42in., and the distance between about 80ft. The actual lay out of the drains is difficult to advise on; each lot of land will require special study. But, as a general guide, I would say, if near a creek, run all the lines straight into it; but if the outlets are limited, then the lines will probably be laid out like the backbone and ribs of a fish; but whichever style is used, the principle is the same. If there must be a main, then it must be of larger area than the side drains. A drain 24in. deep will drain only half the area of a 48in. drain in the scheme. The first systems of drainage recorded were in France, in the year 1600, and tile drainage was introduced into England in 1800. Drains are formed by digging trenches to the required depth, placing in them some material which will allow a free passage for the surplus water, and filling in the soil again in such a manner as not to cause obstructions to cultivation. The first material used was the end of branches of trees. I have myself used wattle sticks, and found them answer very well. Then drains of planks were made, sometimes square and sometimes V-shaped, and with holes bored in them. I know of some of those drains in South Australia. Blocks of peat, with holes bored to form pipes, and stones, especially rounded stones, were extensively used; but, surpassing all, is the tile or porous pipe drain. There is no special need for the tile to be porous, but it must be straight. Tile drains are cheapest in the end, because they are practically everlasting, and if placed at proper depths, do not give any trouble. I recommend that tile drains should be installed. If a ready outlet can be secured, a 2in. pipe will drain up to 500ft., a 3in. pipe will do 1,000ft., and so on; thus, if there is one length of 1,000ft., 500ft. of 3in. would be used nearest the outlet, and 500ft. of 2in. in the higher land. If the lay out scheme includes several mains, dig the main trench 4in. deeper than the side drains, and use a 4in. tile or pipe in it. Just let the side drains come in on top of the main. No junctions are necessary. Start all drains from the outlet, and keep a general fall throughout, being of necessity guided by the contour of the land; but no flat places must be allowed, or silt will accumulate. The lowest possible fall is 3in. in 100ft. For those who can afford to do so, I would recommend that they ask a surveyor to lay out the lines and give the grade; but most gardeners will get all they require with a good level and three or more "boning rods" or T's, made 3ft. high, with a 12in. cross piece of 3 x 1 timber. The first three cuts of the trench can be done with a plough. Then is used a narrow long-bladed spade to the depth, the actual bottom being cut with a hoe, shaped half round. With this the grade is completed, and the trench is ready for the tiles or pipes. Start laying the tiles from the outlet, which must be placed so that there is no possibility of its being overgrown or silted; it must be kept constantly clear, and must be protected from breakage; a bit of iron pipe is advisable if procurable. See that the tiles are clean and straight. Do not use a curved one at any time. Lay them close up to each other, and drop a bit of tarred paper on top at the joints. The final tile will, of course, be blocked. A piece of broken tile makes a good finish. In soils liable to silt the pipes, the terminal end may be brought above ground by means of a piece of galvanized downpiping. This is used as a means of testing which subdrain may have become blocked. In filling in the soil, the plough will be used, care being taken to send the subsoil in its proper place. Heap up the top soil, and it will soon sink to its level, and the surface will present an unbroken appearance. If a diagram of the water level in a drained patch of land could be obtained, it would be a series of curves like waves, the deepest part being at the drain, and the shallowest midway between the drains. A point I have not mentioned is that soils of a salty or alkaline nature are benefited considerably by drainage, and in course of time the injurious salts are removed. To be successful, irrigation must be assisted by drainage. The water removed by the drains enters from under, and gets easily into the tiles at the joints. The use of the tile drain is becoming more extended every year, and in many districts there is no thought of establishing an orchard before the land is drained; and it pays. No one knows better than the members of the Longwood Branch of the Bureau the effect of a waterlogged soil. Some locations do not require drainage, but they are few and far between, and have a natural system, and generally will serve as a demonstration of a successful property. In preparation for planting the trees should be ordered from the nursery months ahead of planting time. Having the plan drawn up will simplify marking out. I recommend that a number of stout wattle sticks or stringybark seedlings be placed at the end of each row. First set out the outside rows; drive down a stake at the spot each tree is to occupy, well into the ground; be careful of the measuring, 20ft. squares between trees is about right. Set out the middle rows, then the centre of the divisions, and then it will be easy to complete the whole filling in. Dig a hole around the stakes, about 3ft. in diameter, 12in. in depth at the outer edge and 6in. at the stake. With a bar shake up the subsoil. Get the holes out as early as possible in the season; the more weathering the soil gets the better. If able to, go for trees to the nursery; choose a nursery, if possible, which has soil similar to that to be planted. Choose trees with a single stem and a good root system. Make sure that they are worked on right stocks, and have no disease. Clear them of weeds, and then get home and heel them in—that is, put their roots in a trench and cover then with moist earth, each lot at the end of the row it is to occupy. When examining the trees at planting time, cut off any broken roots; put the tree in position, the roots to go as near as possible as before lifting, but taking special care to keep one of the strongest roots towards the prevailing wind. Separate the fine roots, and keep them in their proper layer; press the earth firmly around the roots with the foot, and fill in the remainder of the soil. Tie the stem of the tree to the stake with a loose loop, and cut of at about the height of the knee. The time to plant is any time in winter, that is if the land is drained; but do not go on in the heavy rain. Personally, I like to start as soon as the nurseryman can lift the trees. If compelled to continue until spring time, it may be necessary to water the trees several times; but I would sooner leave them in the nursery than plant too late. Do not plant too large a block of one variety—that is to say, if planting Rome Beauty (or any other sort), do not have more than two rows in one place; put another sort in the next row, because some sorts require other special sorts to fertilise them; but I cannot go into this question now. Do not plant sorts which are liable to destructive diseases, such as "bitter pit," &c. It will depend on the available market what sorts should be planted, but it is not good to plant too great a variety. If it is intended to depart from the sorts in general use, pay a visit to the Government Experimental Orchard, Coromandel Valley, and inquire if they have a record of the sort selected. Such a visit will probably be helpful, and may avert serious loss. A select list of trees can be obtained from the Department of Agriculture, Horticultural Branch, Adelaide. I know that the subjects I have dealt with are open to discussion, scarcely two gardeners think alike on the matter; but I have not given anything that I have not seen borne out in practice, or have gleaned from some work of standard value.

## MOUNT BARKER.

December 6th.—Present: 51 members.

**Fodder Crops.**—In detailing his experiences with land in the district, Mr. John Craig, in a paper on fodder crops, said that he had tried many experiments with his land, without success. Then he observed that his tenants had only ploughed to a depth of 3in., and that their crops came up well, but failed after reaching a certain stage. Some of the plants which he dug up showed a cramped characteristic in their roots; therefore he determined to plough deeply and use 1cwt. of bonedust to the acre. The result was quite satisfactory, the land yielding 2 tons of hay to the acre and 60bush. of Algerian oats. Finding that the native grasses were only available for three months in the year, he tried to improve his pasture land by obtaining a grass which would adapt itself to the conditions, and be an improvement on the native fodder. He put in two acres of lucerne on a light, gravelly soil, without manure. It happened to be a good season for lucerne. There was not a great showing, but it was a distinct improvmeent. He also tried clover and cocksfoot, and had good results. The cocksfoot grew in tussocks, however, and it was difficult to cut for hay; therefore stock were turned into it, and in two years it had gone. Prairie grass did well for two years, and then died out. He tried almost every kind of grass, with varying success, except red clover, which did really well for three years. Unfortunately, the bumble bee was required to fertilise the red clover, and as that insect did not exist in South Australia, the plant did not seed, and had to be resown occasionally. Bumble bees were plentiful in Tasmania and New Zealand, and red clover thrived there. It was a splendid fodder plant, and stood cutting in the same way as lucerne. He had tried paspalum and rye, in conjunction with lucerne, but they both failed. Altogether he had planted 80 acres with various grasses, and the result was that instead of carrying four or five head of crippled cattle, he had 50 head of stock in the pink of condition, and he had transformed what had been a useless section into valuable pasture land. The manures he had used had been, at first 1cwt. of bonedust per acre; but when that became too expensive, he used 2cwt. of guano, and it answered well. Every alternate year he used 1cwt. of grass manure. Although much might be learned from those who had gone before, individual experience was best. Every farmer should endeavor to find some fodder plant which would improve his pasture land, and thus serve a useful purpose for the district and the State.

## MOUNT BARKER.

January 3rd.—Present: 37 members and two visitors.

Feeding and Breeding Poultry for Egg Production.—The man in charge must be an enthusiast, premised Mr. E. Beythien, in a paper dealing with the feeding and breeding of poultry for egg production, and he added that sound practical knowledge and experience of feeding and breeding for egg production were essential. He emphasised the word practical, because theory was a rotten stick to lean upon where egg production was concerned. When he used the word poultry, he meant White Leghorns, because, in his opinion, they were the only fowls worth troubling about. There were many methods of feeding laying stock, but it was advisable to study local conditions and work accordingly. Although there were many advocates of the dry mash system, after a series of trials and experiments, he personally preferred wet mash, because he had always got the most satisfactory results from it. Dry mash might be labor saving, but birds certainly appreciated wet mash more; and, another thing, they always seemed to be bigger, brighter, healthier, and in every way more vigorous when reared and fed on the latter. He always fed mash in the evening, but he had only decided to do so after closely watching results of trials, which plainly showed that mash was the main egg-producing food. It was in that form that extra meat meal could be fed if required, oil cake, sunflower, linseed, or crushed oats, and maize could be added, sulphur or Epsom salts could be given—in fact, mash could be composed of not only bran and pollard, as most people thought, but also of any and every necessary food stuff required for body wear and tear, and also for heavy egg production. Besides that, it was in a form more easily digested and assimilated than when the bird was packed with hard grain at night. Heavy grain feeding was a relic of the days when show birds were bred, and tight-feathered bodies were required. Some poultry writers advocated heavy grain feeding at night, especially on cold nights, because they said the grinding in the crop promoted warmth. That was not so. Food easily assimilated without much bodily exertion always promoted far greater body heat, and it was just on the amount of energy necessarily wasted in assimilation that the value of a food stuff was rated high or low, as the case might be—that was, of course, all other things being equal. A bird, well nourished by day, never felt the cold at night; Nature provided against that. In experimenting, he went further, and after dividing a flock of pullets, full sisters of the same age, into four pens, two pens were fed mash twice a day, morning and evening, but only as much in the morning as they would clean up quickly, with full and plenty at night, and a light feed of grain to make them scratch, and plenty of green feed was given at midday. The other two were fed mash once a day, as usual. The trial lasted five months, from April 1st to August 31st, that was through the winter months, and he found that birds fed wet mash twice a day laid a shade over 20 per cent. more than the others. That settled all arguments for him; but as wet mash entailed too much labor where a big commercial plant was concerned, he looked for a method of feeding whereby as much mash as possible could be packed into a bird in one feed. He found that that could only be done, without injurious results, by feeding it in the evening. If birds were overfed wet mash in the morning, they found the nearest shady tree and slept it off, eventually becoming over fat, lazy, loafing sluggards, and the egg yield fell off accordingly. Whereas, if a light feed of grain were thrown in litter in the morning, with abundance of green feed at midday, the birds were actively scratching all day, and worked up a grand appetite for the evening meal of mash, when they could pack their crops tightly with egg-producing food, so easily digested and assimilated that they slept comfortably all night, and awoke next morning as keen as ever for the grain in the litter. To get the best results in egg yield, a pullet or hen must be kept up in condition, and must therefore be encouraged to eat heavily of rich foodstuffs. The appetite should be stimulated to the fullest extent possible, without actually overdoing it and bringing on indigestion. The droppings should be watched for the danger signal in that regard. Someone once wrote that "any healthy, normal, well-fed hen could be depended upon to show a good egg record." That was to a certain extent true, but it was also very misleading, and that was just where "breeding" came in, for unless breeding and strain were behind the bird, in most cases, no matter how healthy a bird might be, good food would be wasted on it, from a commercial point of view. The best of feeding could only induce a hen to lay to the limit of her capacity. Therefore a man must start with good stock birds, bred for generations for heavy egg production, and only with those that had reached full maturity and were healthy, vigorous, and of stout constitution. It was an open question whether the parent birds would transmit their good qualities to their sons and daughters generally; still, if both sire and dams were known, a close watch could be kept on the progeny, and which matings were satisfactory or otherwise decided. The daughters of good layers, even when mated to sons of good layers, would produce a fair percentage of inferior birds, which should be watched for and culled out from any future breeding pen. Like produced like, only with certain great reservations. It was generally acknowledged that it was to her sons that a heavy layer was most likely to transmit her good qualities; therefore, when mating up, the greatest care should be taken in selecting the male birds. Only sound, vigorous, and well-developed specimens that had reached maturity should be chosen, for it was through breeding from immature stock, especially when related, that heavy chicken mortality, small eggs, weedy stock, and low egg yields could almost always be traced. Immaturity in breeding stock was likely to bring about damage to the flock that would take years to rectify. The only way to know the stock and the breeding that was behind it was to practise line breeding; and he had found that line breeding, carefully carried out, had brought about no degeneration of the stock during the past six years on his own farm. Rather had the stock improved in size, type, and egg production; but the breeders were carefully selected and well matured. In-and-in breeding was often practised without true regard to vigor, constitution, and maturity, and birds were selected simply with a view to heavy egg production. That was, pullets that had laid heavily during the first year were selected on that score only. A man who did this was looking for trouble, and after a few years would surely find it. For it was then that a strain was said to run out, and, of course, inbreeding was blamed. There had been many instances of that locally. Such a result did not come from close breeding of related stock, and it had never been proved that inbreeding, pure and simple, was the cause. It had been proved, times out of number, however, that breeding from closely related and immature stock would bring about that result. All stockbreeders, whether of birds or animals, knew that inbreeding was essential if good qualities were to be perpetuated. Therefore, they should be careful to use only well-matured, sound, healthy stock, that was known to possess strong constitutional vigor, in the breeding pens. The sons or daughters of the heaviest layers should be chosen if they had those qualities.

## SANDALWOOD.

January 6th.—Present: nine members.

Dairying.—Dividing the subject into three heads, namely—(a) Stock, (b) feeding and milking, (c) buildings and treatment of produce, Mr. Oakshott, in a paper on dairying, proceeded to say, under the first head, that the cow should have good length and depth in the body, including the couplings, showing the capacity of the animal to turn large quantities of food into milk; general refinement of form in head, neck, withers, and limbs; good development of udder and milk veins; constitution, as shown in broad chest, much width through the heart, a full, clear, eye, and an active carriage; downward and outward sprung ribs, open spaced and covered with soft pliable elastic skin; triple wedge shape, increasing width from withers downwards, from shoulders backwards, and in top and bottom lines backwards; head medium to fine, clean cut, and relatively longer, lighter, and more dished than the big breeds, eyes prominent and lively, forehead broad and dished, horns fine, ears medium and active; neck longish, light, and almost slim, fine at the junction of the head, and widening, deepening, and opening gradually; back straight as far as the pelvic arch, spinal column well defined, forequarters lighter than the hindquarters, and spare with narrow withers, brisket wedge-shaped, arm inclined to be light, barrel long and paunch-shaped, flanks fairly well filled in front, hind flanks thin, but not sunken, hindquarters long, wide at the top of the hips and coming well down without fullness, hips not heavy, thighs inclined to be tight, and more or less incurved, tail not coarse, tapering, of good length, and hanging at right angles to the back; udder long, broad, and deep, extending well under the belly, and well up behind the tail, evenly quartered, well let down, but not pendulous, with the skin hanging in loose folds behind when the udder was empty—it should be fine, elastic, and not fleshy, veins well defined, hair soft and sparse, teats medium in size, squarely placed on and pointing slightly outwards; milk veins should be large, tortuous, and preferably branched; legs medium in length, fine in bone, straight, and fairly wide apart, and yet well under the body. "The bull is half the herd" was a well-known saying and true. The dairy bull should be stronger in bone, more masculine throughout than the cow, especially in head and neck, with an absence of beefiness in body and limb. He should come from a good butter-producing stock, and the dam and granddam, on both sides, should have good milking records. It was particularly important that his pedigree should show no mongrel blood, or hereditary taint either in constitution, temper, or disease. He should have easily traceable milk veins along the lower line of the belly; plenty of skin along the rear parts of the underline; embryo teats large, distinct, well placed forward, and wide apart; testes well formed in the scrotum, of equal size and visible from behind; a good, healthy, flexible skin; low-set body; a good temper and gentle disposition. He should be open behind, with spare thighs, and it should be ascertained that he was prepotent. The best cattle for pure dairy purposes were Jersey, Guernsey, Ayrshire, and Holstein, but in that district the dual purpose breed (*i.e.*, beef and milk) was most useful. Of those breeds, the Shorthorn was quite the best. In pure stock, at two years the weight of a steer should be from 1,200lbs. to 1,400lbs., at three years 1,500lbs. to 1,900lbs. Heifers, at three years, should be from 1,300lbs. to 1,600lbs. Shorthorn milk should average about 3.80 per cent. of fat, and solids not fat about 9 per cent. Another breed that would be useful in the mallee country was the Kerry, because they were hardy, with robust constitutions, were small feeders, and would live and do well on coarse feed, where other breeds would die. They would produce butter at a lower cost for feed than any other other variety. Their average yield of milk was from 3galls. to 4galls. per day—test about 4 per cent. They were small, but the meat was of good quality, and they were easily fattened. The Kerry cattle made a splendid cross with the Shorthorn. In regard to feed and milking, natural green grass or lucerne was the very best feed for dairy stock, but, for a large part of the year that was not to be had, and hand-feeding was necessary. For that purpose ensilage was the best. Ensilage could be made from any crop, preferably from maize; but that was out of the question in that district. Crops suitable there were barley, wheat, oats, rye, and perhaps sorghum; in fact almost anything in the way of green herbage could be used. Mixed crops were good, such as barley and tares, or oats and tares, if tares could be grown. Ensilage needed other things with it for the best results, such as lucerne chaff, bran, copra or linseed cake, etc., about 40lbs. ensilage with 10lbs. lucerne chaff and 5lbs. cake or 8lbs. bran making an excellent daily ration for a cow in full milk. Rock salt should be available at all times, and plenty of fresh water. Even when grazing it was a good plan to give the cow a small feed at milking time, because it kept her quiet and contented and she then gave the best results. The milking times should be as nearly 12 hours apart as possible, and care should be taken to adopt cleanliness in milking, as in all dairy operations. The udder should be washed with warm water before milking, and a gentle, firm rubbing of the udder with the hands had a soothing effect on the cow, and would often make the milk come more freely. One person only should milk a cow, and quietness and gentle handling always paid. Dogs should never be allowed near milking cows. Any excitement would reduce the next yield of milk. The first few jets of milk should be drawn off separately from each teat, and it was well to remember that the first milk was poorest in quality, and the last strippings were the richest. That was one reason for stripping a cow quite dry, and another was that it encouraged her to produce greater quantities. The buildings should be large, airy, and cool, flyproof, and well ventilated, for stale, offensive air, such as was met with in damp underground cellars, very soon spoiled cream or butter, because there was nothing which absorbed a smell or flavor as quickly as milk and its products. When possible, cement floors, laid so that they could be well washed down frequently, were the best both for the dairy and the milking bail. Plenty of clean fresh water should be used both for the dairy and for the utensils as well as for washing the butter itself. Separating was best done with the milk at the same heat as when it left the cow, viz., 98deg. F. When separating was only done in the morning, the night's milk should be brought up to that temperature. As soon as the separating had been finished, the cream should be put away in a cool place (if it could be cooled first, so much the better), and kept at a temperature of 55deg. or 60deg. F. Medium thick cream was then ready for churning in 48 to 56 hours. Thick cream took longer, and thin cream a shorter time to ripen for butter-making. It was very important to turn the separator at the pace set out by the maker. If worked more slowly cream was lost, and a lot of milk would get in the cream; if worked at a faster rate, the milk had not time to separate properly, and ran out with the skim. The churn should be scalded out before use, and then rinsed with two lots of cold water to ensure it being well cooled down. All wooden utensils used should be treated in that way, and then rubbed well with salt to prevent the butter sticking. The speed for turning the churn depended on the make of the churn and on the temperature and condition of the cream. Under varying conditions the butter-maker would know better than the maker of the churn. Cream for churning should not be more than about 53deg. F., as a higher temperature meant that some cream would go off in the buttermilk. To ensure the least possible waste, the butter should not come in less than half an hour. If, while churning, the cream became too thick to circulate properly, cold water should be added, but not enough to make the cream too thin. When the butter began to form in tiny pieces the size of a pin's head, the churning should be stopped and all the cream from the sides of the churn washed down with clean water about 45deg. to 50deg. F. Then the cream should be churned again until the pieces were about the size of No. 5 shot, when the butter should be washed until all the buttermilk had been removed. All the water should be drained off, and from ½oz. to ¾oz. of salt per pound worked in, the larger quantity being used for butter which was to be kept any length of time, say for export. The butter was better if left in a cool place to drain before making up or boxing. Coloring could be used, and if so should be put in the churn with the cream. In washing all dairy appliances lukewarm water should be used first, and then hot water with soda (½ per cent.), and finally scalded out with steam or boiling water. The utensils should then be turned up on a bench, where they would dry of their own heat.

### STRATHALBYN (Average annual rainfall, 19.28in.)

January 9th.—Present: 14 members.

**Why are our Hills Neglected?**—Taking this question for a title, Mr. W. H. Cuming read a paper, in which he referred to the area of land along the Commonella Creek, which rises 10 miles west of Strathalbyn and, after winding its way through some splendid hill and flat country, flows into the Angas River at Strathalbyn. There were fewer people on the area referred to at the present time than there were 50 years ago, he said. As to the producing capacity of the land, if it were cultivated in a workmanlike manner, drilled in May, at the rate of 1bush. seed and 100lbs. of super., 30bush. of wheat to the acre would be assured. Yields of 60bush. of oats were common. Early sown peas did well; potatoes could be grown in winter and spring on the slopes of the hills, and on the damp flats in summer and autumn. Fruit and vines, especially currants, did well; and in addition, vegetables. Experience had demonstrated that the district was particularly healthy for livestock, tick being the only difficulty with sheep, and that could be overcome by dipping the animals after each shearing. He concluded with the opinion that the strip of country under notice was capable of carrying three times the population at present, three times the number of stock, and it should yield ten times the amount of produce. Mr. Cuming tabled a number of samples of fodders and vegetables by way of emphasizing his opinion.

BLACKHEATH, January 6th.—Mr. R. W. Rolland read a paper on wheat carting, in which he urged the use of a van in that district instead of a wagon because of the long distance it was necessary to travel, and the journey could be completed more quickly with a van and a team of four or five horses. Wagons and lorries were unsuited to sandy country. A van of about 17cwts. could be used on the farm for all classes of work, and with a double brake and fairly wide tyres could carry a load of 40 bags of wheat.

CHERRY GARDENS, January 2nd.—Mr. C. Ricks read a paper entitled "Some Reasons Why Our Young Men Leave the Country for the Towns and Cities." The paper had been previously read at the Hills Conference.

CLARENDON, November 6.—Mr. H. C. Harper read a short paper on weeds that trouble the farmer, in which he urged that if, when noxious weeds made their first appearance, farmers took the trouble to eradicate and destroy them, they would save themselves much trouble and loss.

KANMANTOO, January 6th.—After discussing the best method of exterminating foxes, it was resolved that all farmers and settlers throughout the State be urged to commence poisoning foxes about March 24th, and to continue operations until the end of April. It was pointed out that, if only a few lambs in each district were saved, it would be well worth the trouble considering the present price of sheep.

MACGILLIVRAY, December 5th.—A paper was read by Mr. H. E. Petras, on foals. He expressed the opinion that a foal should be handled early, probably at weaning time. It should be caught with a lasso, the rope passed around a post, and the foal allowed to pull as much as it wished. After some pulling the lasso should be taken off, a rope fastened around the neck, and the foal tied to a post, where it could make a complete circuit. The rope should have a play of not more than 2ft., and should be adjusted so that the animal could not get its feet entangled. After standing for an hour it would be easy to make the foal follow on the rope. Foals treated in that way were really half broken. Mr. H. D. Inglis and H. C. Williams agreed as to the advisability of tying up foals. Mr. A. J. Nicholls and Mr. R. Wheaton preferred to leave the handling of the animals until they were broken in.

MILANG, January 13th.—In the course of a free parliament, Mr. C. W. Ness said that last season he had used Dorset Horn and Shropshire rams, and his experience had been that although the Dorset Horn lambs appeared to be bigger and heavier than the Shropshires, when put in the scales the Shropshires were invariably the heavier. Mr. S. H. Goldsworthy said that he found oats far better than chaff to feed to ewes in lamb.

## SOUTH-EAST DISTRICT.

### MUNDALLA.

December 18th.—Present: seven members and one visitor.

**OATS VERSUS WHEAT.**—Taking oats as the hay crop, Mr. J. E. Staude, in a paper discussing the relative merits of oats and wheat, said that he preferred oats to wheat, because a heavier cut could be relied upon. Land which was sick of wheat would produce a good crop of oats. Horses would do more hard work on a diet of oaten chaff than on a diet of wheaten chaff. There were diverse opinions as to the proper stage at which to cut for hay, but, in his experience, when cut green it was inclined to be bitter, and stock did not eat it readily. He preferred to cut for hay on the ripe side, and following closely behind the binder stook it at once. If large round stooks were built properly it required a good deal of rain to damage the hay. He had known hay well stooked to be quite fresh when opened up after three or four inches of rain. Only the outside sheaves were slightly discolored. The objections to using wheat for hay were that if cut on the green side the color was nice and fresh, but there was no strength in the feed. If cut on the ripe side it was too heating, and horses were more liable to suffer from sore shoulders than if fed on oaten chaff.

### NARACOORTE (Average annual rainfall, 22.60in.).

January 13th.—Present: 17 members.

**Advantages of Educating Children in Elementary Agriculture.**—The underlying suggestion at the back of educating children in elementary agriculture was that those elements should be inculcated chiefly by the schools, remarked Mr. C. J. Jenner, in a paper on that subject. But of course, he continued, the parent or employer would be frequently pointing out to those under his charge, if they happened to be on a farm, illustrations of the principles of agriculture as they arose. Two reasons made the question a national one—(1) The importance of the nation's food supply being maintained; and (2) the lack of abundant coal supply in Australia generally, and particularly in South Australia, which must retard the States in regard to manufactures. For that reason, apart altogether from the complex industrial problems which confronted them, South Australia's prosperity must depend, for the present, largely on its wool and wheat production. It was important, therefore, that the coming generation, especially those living in the country, should have its attention turned to agriculture. A large percentage of the boys in country schools would ultimately settle on the land, and it would be of great value to them if their mental activities should be bent early towards the land, in order that they might enter upon their responsibilities with some clear understanding of the principles which made for success. It was not so much a question of the amount of information imparted, as of the thought provoked. If an energetic lad, with tendencies towards agriculture, could be stimulated to think of the possibilities of properly cultivated land, and be given fair scope, his future was assured, whether he devoted his attention to growing grain or fodder or to raising horses, cattle, sheep, or pigs. It all depended on a few elementary principles, which, to some extent, could be pointed out and experimentally illustrated at school. Early and correct thinking must lead to greater efficiency, which was the clarion call of the day in all businesses. The tendency of the times was towards intense culture, and the greatest success must flow from following scientific principles. If the lad at school had been taught the elements of agriculture, that thought was instilled into his mind, and it might be that labor considerations would lead to the working of smaller holdings, in which the problems of intense culture would occupy a prominent place. Agricultural training taught the children to observe cause and effect. All teaching should be of an experimental character, and careful records should be kept. The "how" and "why" of things should be constantly before the pupil, and the course he would recommend would be as follows:—1. Soil—Origins of soils; kinds of soils and their characteristics; inorganic and organic elements in the soil. 2. Plant life—Kinds of grain crops and uses in production of flour, meal, hay, alcohol, etc. 3. Other crops—Sorghum, peas, lucerne, and their values; germination, relation of soil and air, influence of light (heat and moisture), selection of seed. 4. Tillage—Meaning and purposes of trenching, ploughing, fallowing, dry farming. 5. Diseases—Kinds of diseases, avoidance of diseases, purpose of pickling, etc. 6. Manures—Kinds and uses of manures, rotation of crops. It seemed to him that more use ought to be made of the Agricultural College, and perhaps the high schools could be utilised in developing agricultural education on a scientific basis. Mr. C. Bray said that the paper was interesting and scholarly. Mr. A. Johnstone did not believe in the primary school hours being taken up in such subjects, which could not be taught properly in school hours, and it was only wasting time to attempt it. There should be a separate department for imparting such knowledge. Mr. W. E. Rogers, though not quite agreeing to the teaching of agriculture to the children, considered that a great deal of knowledge of agriculture could be imparted at school which would be useful in after life. Mr. F. A. Holmes believed that if agriculture, in an elementary form, were taught in the schools it would be useful in after years. Mr. S. H. Shinckel held that it did a boy good to know something of agriculture, and it would encourage him to cultivate little things which would beautify his home if he did not follow farming in after life.

KONGORONG, January 2nd.—Mr. T. Dixon read a paper on lucerne growing, in which he urged its advantages as a fodder for stock generally, especially dairy stocks. For five years he had grown lucerne around his homestead, and since last July had taken five cuts from it. He had sown the seed in August, about 3lbs. of seed being used on a quarter of an acre patch, and he had applied stable manure once. Mr. F. Kemp said that the roots of lucerne went down very deeply. Mr. E. E. Morrison was of opinion that lucerne would not do on wet ground. Sandy loam was better than stiff soil if there was a clay bottom. Irrigation was necessary to secure the best results. It was also well to inoculate with the necessary bacteria. Mr. W. A. Aslin recommended commencing with a small patch, and then extending it. Mr. C. S. McLean had seen lucerne flourish on 6in. of soil next to limestone. Mr. C. Kemp said that 4ft. of soil above clay was required.

## LOCKJAW.

Lockjaw, or tetanus, is a poisoning of the great nerve centres by material produced by the bacillus *tetani*. This germ is present in all soil, but only becomes active in the animal body when in a wound to which there is only a limited access of air. In an ordinary way an antidote is produced in the blood, and the bad effects prevented. When, however, this is not produced in sufficient quantity to counteract the poison produced, the symptoms of the disease appear. Nature cures a large number of cases by this method. Prevention is assisted by the use of a serum which increases the activity of the preventive substance, but this is of little use once the disease is established. The free use of Epsom salts, 6ozs. to 8ozs. of which will be sucked up by a horse daily, so alters the blood that the poison is broken up, and if started early enough is a safe method of treatment.—FRAS. EVELYN PLACE, B.V.Sc., M.R.C.V.S., in reply to a correspondent.

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CLARENCE GOODE,

*Minister of Agriculture.*

# POINTS FOR PRODUCERS.

### Agricultural Bureau Conferences.

On Wednesday, March 28th, the Northern Yorke Peninsula Branches of the Agricultural Bureau will meet in conference at Kadina. Sessions will be held in the morning and afternoon.

This gathering will be followed by the conference of South-Eastern Branches, which is being held this year at Bordertown, on Wednesday, April 4th.

At both gatherings, which, as usual, will be open to the public, addresses will be given by officers of the Department of Agriculture, papers read by members of the local Branches, and subjects of topical interest will be discussed.

### Ground Wheat versus Whole Wheat for Fattening Pigs.

Forty spring pigs, divided into four lots of 10 each, were used in experiments conducted by the Department of Animal Husbandry of the Experimental Station at Lincoln for the purpose of determining the relative feeding values of whole wheat and ground wheat when fed to fattening pigs. To the first lot of 10, soaked whole wheat was fed; to the second, soaked whole wheat 19 parts, tankage (slaughter-house refuse) 1 part. Lot 3 received soaked ground wheat, and lot 4 soaked ground wheat 19 parts, and tankage 1 part.

The facts arrived at were that when wheat comprised the entire feed for fattening pigs, (1) 3lbs. of soaked ground wheat produced as much gain as 4lbs. soaked whole wheat; (2) ground wheat produced gains 42 per cent. faster than whole wheat; (3) a noticeable amount of wheat passed through the pigs undigested. When a mixture of 19 parts of wheat and 1 part tankage comprised the entire feeding for fattening pigs, (1) 6lbs. ground wheat produced practically as much gain as 7lbs. of whole wheat; (2) ground wheat produced gains 21 per cent. faster than whole wheat; (3) the whole wheat was apparently better digested when fed with tankage than fed without tankage. Ground wheat proved more profitable than whole wheat for fattening pigs, either when fed with or without tankage.

These facts, says the *International Review of the Science and Practice of Agriculture*, lead to the following conclusions:—A great saving can be effected by grinding the wheat for fattening pigs; pigs can be fattened and marketed on a shorter feed with the ground wheat than with the whole wheat; owing to the faster gains made and the better finish obtained, small amounts of tankage can be profitably fed with ground wheat. In case grinding the wheat is not practicable, a small amount of tankage fed with whole wheat will materially increase the rate of gain, and, on the basis of the prices adopted, will materially increase the profit obtained.

### Paralysis.

From time to time, especially after harvest, inquiries come in as to the cause and treatment of a form of paralysis which attacks horses, generally several in a stable, and most often blacks, browns, and greys of 2 to 7 years. The disease has been called by fearful names, such as cerebro-spinal meningitis, toxæmic paralysis, and so forth. The causes are not scientifically investigated, says the Veterinary Lecturer (Mr. F. E. Place, B.V.Sc., M.R.C.V.S.), but observation shows that a combination of circumstances is required which fortunately seldom occur together. These are, a stage in the development of worms of the bloodworm kind which produce a poison capable of causing paralysis; change in the digestibility of food, such as new chaff and wheat; the growth of moulds, many nearly related to smut and rust; hard continuous work such as harvest involves; exposure to heat or cold; the inoculation of minute parasites by biting flies, which are fond of breeding in scrub and mature about hay harvest. The symptoms are well known, loss of power of the hind quarters, spreading over the body, including the tongue and throat, preceded by constipation, but the urine is generally freely—perhaps too freely—passed. Treatment should commence by clearing the bowels by aloes and enemas, slinging early, a tablespoonful of Fowler's solution of arsenic and a teaspoonful of sulphate of quinine two or three times a day, mustard and liniment along the spine, and hand rubbing the limbs frequently. If qualified veterinary aid is available it should be obtained early, or the chance of recovery is materially lessened.

### Dipping Sheep: A Warning to Flockowners.

At the last meeting of the Advisory Board of Agriculture the Chief Inspector of Stock (Mr. T. H. Williams) again directed attention to the necessity for owners of sheep dipping the animals in poisonous powder dips. Some owners were still using non-poisonous carbolic dips, he said, and only recently a case had come under his notice in which a flock had been treated with a non-poisonous preparation, and three weeks after dipping the animals were showing signs of tick and lice infection. His attention had been directed to instances in which agents for non-poisonous dips had misled purchasers into believing that they were complying with the requirements of the Stock Diseases Act by using these dips. Legislation required sheepowners to use poisonous powder dips, and anything else was useless.

### Imports and Exports of Fruits, Plants, Etc.

During the month of December, 1916, 4,619bush. of fresh fruits, 3,722bush. of bananas, 604 bags of potatoes, 96 bags of onions, 4pkgs. of other vegetables, 31pkgs. of plants, seeds, and bulbs, 662 empty casks, and 116 empty cases, and 18pkgs. bags were examined and admitted at Adelaide and Port Adelaide under the "Vine, Fruit, and Vegetable Protection Acts of 1885 and 1910." One hundred and two bushels of bananas were destroyed, being overripe, and 18pkgs. empty bags fumigated. Under the Federal Commerce Act, 3,381 pkgs. of dried fruit and 200pkgs. preserved fruit were exported to oversea markets. These were consigned as follows:—For New Zealand, 180pkgs. of dried fruit and 200pkgs. of preserved fruit; for London, 1,201pkgs. dried fruit; for Vancouver, 2,000pkgs. of dried fruit. Under the Federal Quarantine Act 4,813pkgs. of seeds, plants and bulbs, etc., were examined and admitted from oversea sources.

During the month of January, 1917, 269bush. of fresh fruits, 10,410bush. of bananas. 20 bags of potatoes, 23pkgs. of other vegetables, and 2,068 empty wine casks were examined and admitted at Adelaide and Port Adelaide under the "Vine, Fruit, and Vegetable Protection Acts of 1885 and 1910"; 410bush. of bananas were destroyed, being overripe, and 298 empty wine casks fumigated. Under the Federal Commerce Act 627pkgs. of dried fruits were exported to oversea markets. These were consigned as follows:—For New Zealand, 260pkgs. dried fruits; for London, 367pkgs. of dried fruits. Under the Federal Quarantine Act, 874pkgs. of seeds, fruits, plants, bulbs, etc., were examined and admitted from oversea sources. Of these 4 bags of Fenugreek seed were cleaned on account of the presence of proclaimed weed pests, etc.

## PLUMS.

With the object of securing a continuous supply of fruit throughout the season, a correspondent has sought information respecting varieties to plant. The following list, supplied by the Horticultural Instructor (Mr. Geo. Quinn) may be taken as an approximate succession of plums, principally for use for dessert and jam making:—

| | |
|---|---|
| (B) | Rivers' Early Prolific |
| (J) | Wright's Early |
| (J) | Formosa |
| (B) | Clyman |
| (B) | Hill End |
| (B) | Early New Orleans |
| (J) | Burbank |
| (BD) | Angelina Burdett |
| (J) | Wickson |
| (WD) | Greengage |
| (BD) | Sugar Prune |
| (B) | Blue Diamond |
| (W) | Washington |
| (BD) | President |
| (WD) | Jefferson |
| (B) | Prince Englebert |
| (J) | Satsuma |
| (J) | October Purple |
| (BD) | Prune D'Agen |
| (B) | Grand Duke |
| (WD) | Reine Claude do Bavay |
| (WD) | Golden Drop (Coe's) |
| (J) | Kelsey |

(W) white to yellow, (D) drying sorts, (B) blue to purple, (J) Japanese.

# INQUIRY DEPARTMENT.

Any questions relating to methods of agriculture, horticulture, viticulture, dairying, &c., diseases of stock and poultry, insect and fungoid pests, the export of produce, and similar subjects, will be referred to the Government experts, and replies will be published in these pages for the benefit of producers generally. The name and address of the inquirer must accompany each question. Inquiries received from the question-boxes established by Branches of the Agricultural Bureau will be similarly dealt with. All correspondence should be addressed to "The Editor, *The Journal of Agriculture*, Adelaide."

## VETERINARY INQUIRIES.

[Replies supplied by Mr. F. E. Placé, B.V.Sc., M.R.C.V.S., Veterinary Lecturer.]

[Extraordinary pressure on space has rendered it necessary to very considerably curtail the inquiry department. Replies to those questions of more general interest only have been published; however, every query received has been replied to through the post.—Ed.]

"N. G. Z.," Lyndoch, has a horse, timid, loses condition in cold weather, and rubs tail.

Reply—The symptoms point to worms, especially the whip worms or *Oxyuris curvula.* Prepare for physic by feeding on bran only for two days, then give a five dram physic ball, obtainable from a chemist. When this has ceased to scour put on ordinary feed, and twice a day for a fortnight give in feed a flat tablespoon of a powder made by mixing ¼lb. each of sulphate of iron, sulphur, saltpetre, gentian, and 1lb. each of sugar and linseed meal.

"R. L. M.," Mount Hope, had mare, three years, which for first six hours was uneasy, striking belly, lying down and partly rolling; second six hours, similar, but putting nose in flank and turning up lip; third six hours, apparently much better, walking about, eating and drinking; fourth six hours, worse, sweating, excited, udder swollen, short, quick breathing, constantly lying, throwing head about and dying. Broken in, but not worked for a fortnight. Lump at navel from birth. Diet, heads from winnower tipped on hard ground, oaten chaff slightly musty. *Post Mortem*—Small bowels distended with wind, inflamed; blind bowel fairly normal, large colon inflamed, with little sand and dirt. Thousands of small white worms, about ¼in. long, a few longer.

Reply—As suspected, the illness and death were due to colic, inflammation of the bowels. The symptoms, well described, show that injudicious feeding combined with a rupture (navel lump) and bloodworms, the long ones *Scl. equinum,* the short *Scl. tetracanthum,* which bore through the bowels and inoculate the system with poisons formed from moulds in the fodder, all combined to bring about fatal results. Full details of treatment may be found in Bulletin "The Horse," obtainable from the Editor for a penny stamp for postage. Another valuable bulletin is one by the Director of Agriculture dealing with substitutional feeding during the drought, which would show the insufficiency of the diet given, even if it were of good quality.

"S. H.," Spalding, has a mare, udder enlarged slightly, and wax on teats which gave milk. She has not been to horse as far as is known.

Reply—Occasionally there is what is called false gestation, when the symptoms mentioned occur without service, but it is more likely that the mare has stolen to horse and slipped the embryo. Treatment is unnecessary, but should she seem out of sorts an ounce of photographer's hypo. once a day for three days will probably put her right.

"J. L. D.," Milang, reports sheep found dead without a struggle, quickly blow up and mortify, blood under skin.

Reply—The symptoms are compatible with eating the weed sent, *Solanum nigrum*, or black nightshade, first cousin to the deadly nightshade. All the plants of this family, including the potato, have poisonous properties which are active at one season and not at another. The symptoms may also point to a blood infection whereby the red cells are broken down. It would be necessary to make a microscopic examination for this, and should more die, if you will send a piece of the fourth stomach with a few inches of bowel attached, and a pickle bottle of dung as passed, this would be examined. Treatment—Cooper's worm tablets.

"F. G. R.," Wepowie, has a foal five months, lame, bottom of hoof swelled, and walks on toes.

Reply—There is laminitis, due to some constitutional disturbance, and the frogs are most affected. Dress these daily with lemon juice, and give five drops tincture aconite twice a day for a week. If there should be breaking out at the hoof head, dress this with lemon juice also. If the foal is still on the mare, give her once daily for a week, an ounce of photographers' hypo.

"F. C.," Spalding, has a mare which foaled twins, did not clean properly, and is dull and out of sorts.

Reply—Give tincture pulsatilla, 10 drops, three times a day for three days and then tincture arsenicum twice a day for a week. If symptoms of fever in the feet set in keep cold swabs on them. Bran and green feed only for a time.

"W. D.," Millicent, has a stallion, 10 years, very stiff, as if foundered, but has had no corn; has a bag of sow thistles a day with bran and chaff, groans when down, will not get up; hoofs hot, eats well, and looks well.

Reply—This is a case of founder; grain is not necessary to cause it, possibly in this case want of exercise. It is even possible that certain components of the sow thistles have contributed to it (glucosides). Treatment—Bleed three quarts at neck vein, keep cold swabs on feet, force to walk a little at least twice a day. Give 20 drops of tincture arsenicum and tincture aconite alternately every four hours for a week. Do not overfeed.

"G. E.," Meadows South, states that young white pigs are rubbing sores on ribs.

Reply—As no vermin can be found it is possible that sun scald is the trouble; this is a kind of eczema. Lightly swab the pigs every now and again with veterinary vaseline or raw linseed oil, or better, give them a rubbing post made by tying a few bags round a post such as the entrance to their sleeping place and soaking them with oil occasionally so that the pigs can rub when they like. Spray occasionally with sheep dip as before. Mix equal parts of sulphur, saltpetre and charcoal, and give each a tablespoon in food daily. Also feed cinders regularly, or allow a box to be kept in the sty.

"J. M.," Riverton, has a cow with large hard udder.

Reply—It would appear that there is chronic congestion of the udder, and the milk should not be used, unless boiled for at least 15 minutes—it would be better not to use it at all. Foment the udder well with hot soapsuds after each milking, and well rub in some strong mercurial ointment..

"A. C. M.," Joanna, reports case of a mare which had dead foal in October, since got fat, but throws leg out at trot; discharges when driven.

Reply—There is evidently damage to the pelvis during birth, which will probably gradually get better. The discharge when driven points to injury of the passage, but she may be driven without further harm. Give her 10 drops tincture aconite each morning and 10 drops tincture arnica each evening for three weeks, also syringe her out with warm water in which a teaspoonful to the pint of baking soda has been dissolved, this may be done once a week before driving.

"S. H. S.," Naracoorte, has a sow paralysed behind.

Reply—The most common cause is worms, and it would be well to give in a little honey or molasses which she will lick off a stick three times a day, 10 drops tincture nux vomica, also to rub the loins with liniment daily; also to give twice daily in feed a dessertspoon of a mixture made of equal parts saltpetre, sulphur and charcoal. Give this for a fortnight or so. This in smaller doses, say a teaspoonful, should be a preventive in the case of the younger one.

"J. A.," Dowlingville, had a bay gelding, 17, which went off feed and was drowsy, moped about and kept on looking at his flank, stamped about and could not pass water easily, this was dark in color; dung slimey and bad smell. He hung about for some time till he one day broke out in a sweat all over; could not rise above his knees, and died. Two years ago a similar case occurred accompanied by cough. The feed had a musty smell.

Reply—The symptoms point to that form of poisoning which seems to arise from the poisons made by blood worms combining with those from musty fodder. The disease gets different names, according to each investigator's fancy, but the treatment is to avoid musty fodder, to clear out bowels at onset by a physic ball, and then to give tincture nux vomica in doses suited to age three times a day, and if possible feed only on green feed and oats.

"J. K. B.," Bordertown, states that pigs were found lying stretched out and dead, only milk in paunch, *i.e.*, stomach; no inflammation. White pig, nine weeks, dead, and purplish pink; food in stomach well chewed, and no inflammation, but in large bowel little blood spots and chocolate-colored pasty contents; another one going same way as first.

Reply—The symptoms point to swine erysipelas, which is a form of blood poison, and is often associated with lice. Spray the pigs over with sheep dip or scrub them with same, also sties before they go into them. Keep them off both barley, stubble and mangolds, as these may be partly responsible for the trouble. Let them have a teaspoonful twice daily of a mixture of equal parts sulphur, saltpetre, and charcoal.

"P. A. G.," Spalding, has black gelding, 9 years, and grey mare, 8 years, affected with paralysis.

Reply—This form of paralysis is much more common in blacks and greys than any other color. It has been called by many names, but seems to be due to a combination of poisons formed by worms and fodder acting together. The treatment of purgatives followed by nux vomica, is most likely to do good when recovery does take place, but it would be well to give the mare two tablespoons of Fowler's solution of arsenic daily and a teaspoonful of sulphate of quinine smeared on the teeth twice a day till power is regained, then once. Owing to paralysis of the throat there is great danger in drenching. If food is at all mouldy or musty it must not be given.

"J. P. S.," Riverton, has a bull with ulceration of eye.

Reply—It is to be feared that the bull will be permanently blind, but relief will be found by dropping into the eye daily a few drops of a solution of 2 grains to the ounce of nitrate of silver. If he is not quiet, and a daily dressing cannot be managed a few drops of tincture euphrasia in a teaspoon of water may be squirted in when opportunity offers, say once a week.

"F. T. M.," Mundoora, reports that a gelding, four years, was kicked; was very lame for a few days; not now lame, but very stiff; stretches neck, and eyes are drawn into head.

Reply—The symptoms, especially the eyes, suggest tetanus, and it may go hardly with him. Put him in a comfortable shed and feed on bran and long green stuff such as lucerne, wet the bran well, and put a couple of packets of Epsom salts in each feed for a week or longer if necessary. Keep him quiet, and do not worry with drenches or anything like that.

## VETCHES.

"Spring" vetch and "Winter" vetch are varieties of the principal cultivated species of vetch (*Vicia sativa*). The distinction between the two is like that of "winter" wheat and "spring" wheat, the former needing a long growing period, and the latter a considerably shorter one. "Winter" vetch should be sown in the autumn as soon as conditions are favorable, whereas the "spring" variety need not be sown until July, or even early August.—W. J. SPAFFORD (Superintendent of Experiments) in reply to a correspondent.

# AGRICULTURAL EXPERIMENTS.—REPORT FOR YEAR 1915-16.

[By W. J. Spafford, Superintendent of Experimental Work.]

## MOORAK.

(Conducted by Mr. A. A. Kilsby.)

During the year arrangements were made, through the Mount Gambier Branch of the Agricultural Bureau, with Mr. Kilsby, to conduct experiments on the rich volcanic soil of the Moorak Estate. For the purpose 10 acres of land were fenced off into two blocks of 5 acres each, the blocks to carry potatoes in alternate years and cereals in the other years. Block A was ploughed in July, and the land prepared for the potato plots, which were divided into tests with varieties and manurial tests with "Snowflake" potatoes.

### Variety Tests with Potatoes.

On October 12th the planting of varieties was commenced, the sets being planted without manure in rows 30in. apart, and with 28in. spaces in the rows, at a depth of 4½in. Immediately after planting was completed 10cwt. of lime per acre was broadcasted on the surface and harrowed in. The returns from the varieties were as follows:—

*Variety Tests with Potatoes.—Moorak,* 1915-1916.

| Variety. | Yield per Acre. | | |
|---|---|---|---|
| | Tons. | Cwts. | lbs. |
| Scottish Triumph | 4 | 16 | 37 |
| Coronation Blue | 4 | 3 | 67 |
| Pinkeyes | 4 | 2 | 71 |
| Red Skins | 4 | 2 | 0 |
| Up to date | 3 | 17 | 76 |
| Snowflakes | 3 | 14 | 108 |
| Excelsior | 3 | 9 | 58 |
| Early Manistee | 3 | 8 | 10 |
| Beauty of Hebron | 3 | 4 | 0 |
| Brownell's Superior | 3 | 0 | 5 |
| Peach Bloom | 2 | 18 | 41 |
| Carmen No. 2 | 2 | 3 | 5 |
| Sussex Red | 1 | 18 | 41 |

Mr. Alcock, who attends to the plots conducted by farmers in the South-East, gives the following brief descriptions of the above varieties:—

*Redskins.*—Mid-season, hardy, strong grower, good keeper, producing tubers of good average size with reddish skin.

*Coronation Blue.*—Mid-season, hardy, spindly growth, good croppers, excellent keepers, producing smooth-skinned oval tubers of a bluish color.

*Pinkeyes.*—Early, excellent croppers, producing round tubers with white skins and deep eyes.

*Scottish Triumph.*—Late, excellent croppers, good keepers, producing smooth tubers with white skins and shallow eyes.

*Up-to-Date.*—Mid-season, hardy, strong growth, good croppers, good keepers, producing good average-sized tubers with white skins.

*Snowflakes.*—Very late, hardy, strong growth, excellent croppers, excellent keepers, producing large-sized, irregular-shaped tubers with white skins.

*Excelsior.*—Mid-season, hardy, good croppers, producing light-colored, red-skinned tubers with deep eyes.

*Early Manistee.*—Early, hardy, good croppers, good keepers, producing flat, oval tubers with smooth brownish skins. Rapid maturing variety.

*Beauty of Hebron.*—Late, tall, erect growth, fair croppers, poor keepers, producing long, white-skinned tubers with a pink tinge.

*Brownell's Superior.*—Mid-season, hardy, robust growth, poor keepers, producing tubers of good average size with dark-reddish skins, resembling Redskins in shape and color.

*Peach Bloom.*—Seed supplied was of a late, poor-cropping variety, not similar to the local variety of this name.

*Sussex Red.*—Mid-season, fair growth, poor croppers, good keepers, producing round tubers with light-reddish, smooth skins and deep eyes, resembling Excelsior.

*Carmen No. 2.*—Early, fair growth, good keepers, producing regular shaped tubers with white skins.

### MANURIAL TEST WITH POTATOES.

The land for the manurial tests was prepared at the same time as that for the varieties. Planting was started as soon as the varieties were finished, and Snowflake potatoes were used on all plots, the manures in all cases except plot 10 being put in the same plough furrow as the sets.

### *Manurial Plots with Potatoes.—Moorak,* 1915-1916.
### *Snowflakes on all Plots.*

| Plot. | Manuring per Acre. | Yield per Acre. Tons. | Cwts. | lbs. |
|---|---|---|---|---|
| 1. | 1cwt. sulphate of potash | 3 | 1 | 65 |
| 2. | 1½cwts. sulphate of potash | 3 | 5 | 10 |
| 3. | 2cwts. sulphate of potash | 3 | 10 | 34 |
| 4. | 5cwts. basic slag and 1cwt. sulphate of potash | 3 | 12 | 47 |
| 5. | 5cwts. superphosphate and 1cwt. sulphate of potash | 3 | 9 | 35 |
| 6. | 5cwts. super., 1cwt. sulphate of potash, 2cwt. nitrate of soda | 3 | 7 | 52 |
| 7. | 6cwts. lime and 1cwt. sulphate of potash | 3 | 14 | 49 |
| 8. | No manure | 3 | 12 | 7 |
| 9. | 6cwts. lime and 5cwts. superphosphate | 3 | 12 | 46 |
| 10. | 6cwts. lime and 5cwts. superphosphate (super. drilled in on the surface | 3 | 13 | 45 |
| 11. | 6cwts. gypsum and 5cwts. basic slag | 3 | 15 | 53 |
| 12. | 6cwts. gypsum, 5cwts. basic slag, 2cwts. sulphate of ammonia | 3 | 3 | 61 |

The yields of potatoes—both in manurial plots and variety tests—is very much lower than was expected, and cannot be a criterion of how the various plots will behave on the average, because the potato-growing season was extraordinary for the district. November gave only a little over an inch of rain; December was practically rainless, with only 4 points; January recovered things to some extent with 187 points; but both February and March were low, particularly the latter month, with 71 and 35 points respectively.

### VARIETY TESTS WITH OATS AND BARLEY.

After the potatoes were removed from the block, it was ploughed up in July, and on August 8th varieties of oats and barleys introduced from New Zealand were drilled in. These varieties were sown at right angles to the potato manurial plots, so that each variety had access to the same proportion of the various residues of the manures used on the potatoes. No manure was used with the cereal plots.

### *Variety Tests with Oats.—Moorak,* 1916.

| Variety. | Grain per Acre. Bush. | lbs. |
|---|---|---|
| Garton's Abundance | 39 | 0 |
| Liggowo | 29 | 39 |
| Webb's Challenge | 26 | 38 |
| Garton's Record | 25 | 34 |
| Ruakura | 22 | 33 |
| Garton's Leader | 22 | 10 |
| Garton's Yielder | 21 | 10 |
| Dun | 19 | 0 |
| Black Scotch | 16 | 23 |
| Sparrowbill | 16 | 16 |
| Long Tartarian | 14 | 27 |
| Banner | 10 | 17 |
| Algerian | 6 | 15 |
| Danish | Failure. | |

Mr. Alcock reports on these varieties as follows:—"All plots germinated well, and by the end of August were well through the ground, and looked well. Tartarian was affected by frost. The subsequent growth of most of the plots was strong and rank, all varieties making excellent headway. The yields were all more or less affected by the presence of cutworms, which continued their depredations even after the crops were cut and stooked. 'Danish' was a complete failure, and Algerian nearly so, owing to the attacks of these cutworms."

During the spring patches in practically all of the plots showed some affection that looked to be the result of a fungus disease. Samples were submitted to the Professor of Botany at the Adelaide University (Professor T. G. B. Osborn), who states:—"On the faded yellow spots on the leaves there has developed fairly constantly a cladosporium, but I fear the cause of the disease symptoms is obscure, though probably the cladosporium is concerned with it. Probably, normally, the amount of damage done would be slight, and the unusual weather this season may be a most important factor in contributing to the increased damage observed by you."

This trouble materially reduced the yields from some of the varieties, as before the warm weather set in the affected patches were rotting down. On the approach of summer the patches partly recovered, but the trouble left its mark.

The following brief descriptions of the varieties of oats were supplied by Mr. Alcock:—

*Garton's Abundance.*—Growth very tall and very coarse, foliage broad and dark green, well headed, grain large, plump, and white, ripening nearly three weeks later than Algerian. Affected by both rust and smut.

*Liggowo.*—Growth very tall and very coarse, foliage broad and dark green, resembles Abundance, but was less affected by rust, and stands up better, grain plump and white, ripening nearly three weeks later than Algerian.

*Webb's Challenge.*—Growth short and fine, good dark color, good stooler, makes very slow growth, well headed; grain long, narrow, and dark brown or black, very late.

*Garton's Record.*—Growth strong and coarse, foliage broad and dark green, grain large, plump, and white, ripening quite three weeks later than Algerian. More or less affected by rust.

*Ruakura.*—Growth rapid, fine and short, foliage good color, good stooler, well headed, grain medium sized, slate colored, early, badly affected by cladosporium.

*Garton's Leader.*—Growth not as coarse as other Gartons, but more erect, foliage lighter color, grain large, plump, and white, some rust.

*Garton's Yielder.*—Growth tall and coarse, straw robust, foliage broad and dark-green color, well headed, grain large, plump, and white, ripening about a fortnight later than Algerian, rust on leaves and straw.

*Dun.*—Growth short and fine, foliage dark green, makes slow growth, good stooler, well headed, grain small and slate colored, very late, badly affected by cladosporium.

*Black Scotch.*—Growth short, fine and erect, foliage dark green, grain medium sized and black or dark brown, very late.

*Sparrowbill.*—Growth strong and vigorous, went down badly in patches, foliage dark green, well headed, grain short, plump, and white.

*Long Tartarian.*—Growth erect and fairly coarse, foliage lighter color than most varieties, grain long, narrow, and white, ripening late. Frosted badly, only producing grain on one side of the heads.

*Banner.*—Growth strong, erect, and coarse, foliage very broad and dark-green color, well headed, grain medium sized and white, ripening later than Liggowo.

*Algerian.*—Growth of medium height and fairly fine, foliage lighter than most varieties, fair stooler, grain medium size of amber color.

*Danish.*—Growth and general appearance resembling Algerian, but ripening much later, grain short, plump, and yellowish.

### *Variety Tests with Barleys.—Moorak,* 1916.

| Variety. | Grain per Acre.<br>Bush. | <br>lbs. |
|---|---|---|
| Gisborne | 39 | 0 |
| Wind Resisting | 36 | 2 |
| Kinver's Chevalier | 24 | 17 |
| Archer's Chevalier | 20 | 34 |

The Chevalier barleys made good growth, but did not fill like the other two, and they were more affected by cutworms than were the latter.

Mr. Alcock sends the following descriptions of the above barleys:—

*Gisborne.*—Growth strong and even throughout, foliage good healthy color, good stooler, well headed, heads like Duckbill, grain well filled and with fine husk.

*Wind Resisting.*—Growth medium height and erect, foliage dark-green color, good stooler, well headed, heads resemble Duckbill, grain very fair.

*Kinver's Chevalier.*—Growth medium height, but straw weak and easily lodged, good stooler, well headed, heads very long, grain large and coarse.

*Archer's Chevalier.*—Growth medium height, but straw weak and easily lodged, foliage dark green, good stooler, heads very long, grain good light color and not too coarse.

In the conducting of these plots, and particularly the potato experiments, Mr. R. Fowler, the Inspector of Fruit, &c., stationed at Mount Gambier, has given us very valuable help, both in the actual work connected with them, and with the very best of advice.

## EXPERIMENTS WITH THE MANURING OF WHEAT AT SADDLEWORTH.

(Conducted by Mr. F. Coleman.)

In 1905 Mr. Coleman started a series of permanent manuring plots with wheat, and for the 12 years since that time these plots, testing the effects of various manures on the yield of wheat grown on bare fallow, have been carefully conducted by him. For the purpose Mr. Coleman has set aside a field, one half of which is bare fallowed every year, the other half carrying the wheat crops. Each half is permanently pegged into plots, ensuring that each time the plots are cropped they occupy exactly the same space. Each plot receives exactly the same manuring every time that it is in crop, so that the longer these experiments are continued the greater will be their value. A report on the results of these plots, together with Mr. Coleman's remarks on them, has been published each year. For 1916 plots, Mr. Coleman says:—"The plots suffered from too much wet, which appeared to check the wheat, but allowed wild oats, &c., to grow. Milk thistles are becoming a trouble in the plots. The northern side of plot 1 was affected by the rubbish growing along the fence, whilst on the other hand the best piece in the plots was on the south side of plot 8, against the fallowed piece to be sown this year. These differences are corrected each year, as plot 1 comes alongside fallow this year, and plot 8 alongside a fence where rubbish can grow. Federation wheat was sown at the rate of 74lbs to the acre on all plots on July 5th."

### TABLE 1.—*Showing Yields for* 12 *Years of Manurial Plots at Saddleworth. Each Plot Half-Acre in Area.*

| | PLOT 1. | | PLOT 2. | | PLOT 3. | | PLOT 4. | | PLOT 5. | | PLOT 6. | | PLOT 7. | | PLOT 8. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1cwt. Mineral Super. per Acre. | | 1cwt. Mineral Super., 5cwts. Lime per Acre. | | 1cwt. Mineral Super., ½cwt. Sulph. of Potash, ½cwt. Nitrate of Soda per Acre. | | 1cwt. Bone Super. per Acre. | | No Manure. | | 1cwt. Mineral Super. ½cwt. Sulph. of Potash per Acre. | | ½cwt. Sulph. of Potash and ½cwt. Nitrate of Soda —for first 7 Years. 2cwt. Mineral Super. for last 5 Years. | | 1cwt. Mineral Super., ½cwt. Nitrate of Soda per Acre. | |
| | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. |
| 1905........ | 31 | 0 | 29 | 22 | 33 | 48 | 34 | 36 | 29 | 50 | 35 | 6 | 30 | 38 | 33 | 10 |
| 1906........ | 32 | 20 | 34 | 10 | 32 | 22 | 33 | 56 | 23 | 40 | 33 | 34 | 24 | 42 | 36 | 8 |
| 1907........ | 35 | 42 | 38 | 2 | 39 | 8 | 36 | 22 | 24 | 52 | 35 | 32 | 25 | 16 | 35 | 50 |
| 1908........ | 17 | 38 | 19 | 28 | 20 | 52 | 17 | 34 | 7 | 36 | 19 | 36 | 8 | 50 | 18 | 52 |
| 1909........ | 31 | 42 | 32 | 54 | 35 | 6 | 30 | 40 | 24 | 32 | 29 | 34 | 23 | 18 | 33 | 34 |
| 1910........ | 21 | 4 | 22 | 26 | 25 | 20 | 26 | 24 | 15 | 12 | 28 | 34 | 15 | 28 | 29 | 38 |
| 1911........ | 21 | 54 | 24 | 0 | 24 | 40 | 24 | 44 | 15 | 30 | 24 | 6 | 15 | 34 | 20 | 40 |
| 1912 ....... | 23 | 34 | 27 | 22 | 27 | 50 | 28 | 56 | 12 | 58 | 26 | 14 | 29 | 36 | 23 | 58 |
| 1913........ | 26 | 22 | 26 | 36 | 25 | 14 | 24 | 36 | 4 | 56 | 22 | 44 | 21 | 10 | 20 | 34 |
| 1914........ | 7 | 34 | 11 | 54 | 10 | 46 | 12 | 0 | 5 | 56 | 10 | 56 | 12 | 34 | 11 | 44 |
| 1915.... ... | 22 | 46 | 18 | 48 | 25 | 26 | 19 | 34 | 1 | 36 | 20 | 54 | 13 | 38 | 21 | 46 |
| 1916........ | 13 | 22 | 17 | 32 | 19 | 6 | 17 | 54 | 15 | 32 | 15 | 46 | 19 | 46* | 21 | 16 |
| Mean for 12 years .. | 23 | 45 | 25 | 13 | 26 | 38 | 25 | 36 | 15 | 11 | 25 | 13 | 19<br>*5 years. | 21 | 25 | 36 |

*Plot 7, from 1905 to 1911 inclusive, received ½cwt. sulphate of potash and ½cwt nitrate of soda per acre.

### TABLE 2.—*Showing Increased Yield of Manured Plots over Unmanured Plot in* 1916.

| Plot 1 | Plot 2. | Plot 3 | Plot 4. | Plot 5. | Plot 6. | Plot 7. | Plot 8. |
|---|---|---|---|---|---|---|---|
| Bus. lbs.<br>—2 10 | Bus. lbs.<br>2 0 | Bus. lbs<br>3 34 | Bus. lbs.<br>2 22 | No manure | Bus. lbs.<br>0 14 | Bus. lbs.<br>4 14 | Bus. lbs.<br>5 44 |

TABLE 3.—*Showing Value of Increased Yield of Manured Plots over Unmanured Plot in* 1916.

| | Plot 1. | Plot 2. | Plot 3 | Plot 4 | Plot 6. | Plot 7. | Plot 8. |
|---|---|---|---|---|---|---|---|
| | *£ s. d.* | *£ s. d* | *£ s. d.* | *£ s. d.* | *£ s. d.* | *£ s. d.* | *£ s. d.* |
| Value of increase at 3s. 5d. per bushel. | -0 7 5 | 0 6 10 | 0 12 2 | 0 8 1 | 0 0 10 | 0 14 5 | 0 19 7 |
| Cost of Manure... | 0 4 0 | 0 9 10 | 0 18 0 | 0 5 6 | 0 11 0 | 0 8 0 | 0 11 0 |
| Net value of incrse. | £-0 11 5 | £-0 3 0 | £-0 5 10 | £0 2 7 | £-0 10 2 | £0 6 5 | £0 8 7 |

Value of various manures taken as:—Mineral superphosphate, £4 a ton; bone superphosphate, £5 10s. a ton; sulphate of potash, £14 a ton; nitrate of soda, £14 a ton. These manure values are obviously incorrect for 1916—in fact, sulphate of potash cost £36 a ton, but this is a fictitious price due to the war. Should the price of these fertilisers keep high, it will be necessary in the near future to alter the values so that they approach the average.

TABLE 4.—*Showing Increased Yield of Manured Plots over Unmanured Plot for the period* 1905 *to* 1916 (12 *Years*); *together with Net Value of Increase and Average Annual Increase.*

| | Plot 1. | Plot 2. | Plot 3. | Plot 4. | Plot 6. | Plot 7, 5 years. | Plot 8. |
|---|---|---|---|---|---|---|---|
| | Bus lbs. | Bus. lbs. | Bus. lbs. | Bus. lbs. | Bus. lbs. | Bus. lbs | Bus. lbs. |
| Increased yield for 12 years .......... | 102 48 | 120 24 | 137 28 | 125 6 | 120 26 | 55 46 | 125 0 |
| | *£ s. d.* | *£ s. d.* | *£ s. d.* | *£ s. d.* | *£ s. d.* | *£ s. d.* | *£ s. d.* |
| Value at 3s. 5d. per bushel ............ | 17 11 3 | 20 11 4 | 23 9 8 | 21 7 5 | 20 11 6 | 9 10 6 | 21 7 1 |
| Cost of manure ...... | 2 8 0 | 5 18 0 | 10 16 0 | 3 6 0 | 6 12 0 | 2 0 0 | 6 12 0 |
| Net value of increase | 15 3 3 | 14 13 4 | 12 13 8 | 18 1 5 | 13 19 6 | 7 10 6 | 14 16 1 |
| Average annual value of increase ........ | 1 5 3 | 1 4 5 | 1 1 2 | 1 10 1 | 1 3 3 | 1 10 1 | 1 4 7 |

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## 1.—EYRE'S PENINSULA EXPERIMENTAL FARM.

### (Manager—Mr. L. J. COOK.)

This farm consists of 3,041 acres, comprised of the sections 26, 27, and 28, in the hundred of Minnipa, situated 158 miles north of Port Lincoln. It is fairly centrally situated, as concerns the whole of Eyre's Peninsula, and is the point from which departmental activities in agricultural matters on that vast stretch of arable land will proceed. It should serve to advertise the possibilities of this practically unknown country, and should hasten the day when up-to-date farming methods are the recognised practice of that part of the State. The whole of the farm is gently undulating, and practically the lot of it can be put under cultivation. The above-mentioned sections were dedicated a reserve for agricultural purposes in November, 1914, and a manager was appointed on January 1st, 1915, who commenced operations in that month.

### THE SEASON 1916.

The year opened with 80 points of rain in January, but with very little in both February and March; but the rainfall in the first three months of the year plays but little part in wheat growing, other than germinating weeds on the fallowed land, and so giving a chance to clean it.

April only gave 27 points of rain, which is very low for this month in an "early district," for during this month the land should at least be prepared for seeding, and some of it should be sown. Over 1in. was registered in May, and both June and July each gave over 3½in. These rains permitted a proper seeding of crops, although it was late. In each of the spring months—August to October—good falls were registered, and they totalled 6.80in. for the period. November also gave a good fall, registering a little over an inch, and in December 0.12in. fell, which was quite enough for the season. We only have records at this farm for one other season, and the following table shows in detail the rainfall for the two years:—

*Rainfall Distribution at Minnipa,* 1915-1916.

| | 1915.<br>Inches. | 1916.<br>Inches. | Means.<br>1915-1916.<br>Inches. |
|---|---|---|---|
| January | 0.74 | 0.80 | 0.77 |
| February | 0.09 | 0.04 | 0.06 |
| March | 0.02 | 0.44 | 0.23 |
| April | 1.18 | 0.27 | 0.72 |
| May | 2.03 | 1.23 | 1.63 |
| June | 1.88 | 3.67 | 2.77 |
| July | 2.54 | 3.60 | 3.07 |
| August | 3.57 | 2.55 | 3.06 |
| September | 0.98 | 2.33 | 1.65 |
| October | 0.41 | 1.92 | 1.16 |
| November | — | 1.05 | 0.52 |
| December | 0.44 | 0.12 | 0.28 |
| Total | 13.88 | 18.02 | 15.92 |
| Total "useful" rain (April-November) | 12.59 | 16.62 | 14.58 |

In this district, which is essentially a low-rainfall district, with soils that are of comparatively light texture, "seeding" rains (April-May), "winter" rains (June-July), and early "spring" rains are essential, and, indeed, are all that are necessary to produce crops of wheat.

During the year the "seeding" rains (April-May) were rather light, only totalling 1.50in.; but these were followed by exceptionally good "winter" rains (June-July), which together showed 7.27in. The "spring" rains (August-October) gave 6.80in., and for the "early summer" rains (November) another 1.05in. were collected. These really good winter, spring, and early summer rains easily counteracted any ill effects from the delayed seeding occasioned by the comparative shortage of "seeding" rains. The table below sets out the distribution of the "useful" rainfall.

*Distribution of "Useful" Rainfall in* 1916, *Comparatively with the Means for* 1915-1916.

| | 1916. | Means. 1915-1916. |
|---|---|---|
| | Inches. | Inches. |
| Seeding rains (April-May) | 1.50 | 2.35 |
| Winter rains (June-July) | 7.27 | 5.84 |
| Spring rains (August-October) | 6.80 | 5.88 |
| Early summer rains (November) | 1.05 | 0.52 |
| Total "useful" rain | 16.62 | 14.59 |

CROPS.

The farm was only started in January, 1915, and as all land clearing is being done properly, *i.e.,* by removing the roots of all trees growing on it, the cropping area added each year must of necessity be comparatively little. In 1915 there was cropped 148 acres, and as this was the first crop the land had carried, it was decided to recrop it this year. Besides this, 75 acres were grubbed, some of it bare fallowed, and the remainder cropped on autumn cultivation. The cropping consisted only of the cereals wheat and oats, most of the wheat being of selected pure strains of varieties from which first-class seed could be sold.

*Hay Crops.*—Nothing was sown specially for hay, as we were carrying large stocks from last harvest. Divisions between blocks and some self-sown was all that was cut for the above purpose, and amounted to an area of 2.341 acres, which produced 4 tons of hay for an average of 1 ton 14cwts. 19lbs. per acre.

*Hay Returns.—Minnipa,* 1915-1916.

| Year. | Total Rainfall. | Useful Rainfall. | Area. | Total Yield. | | | Yield per Acre. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Inches. | Inches. | Acres. | Tons | cwts. | lbs. | Tons | cwts. | lbs. |
| 1915 .... | 13·88 | 12·59 | 148·00 | 280 | 0 | 0 | 1 | 17 | 94 |
| 1916 .... | 18·02 | 16·62 | 2·34 | 4 | 0 | 0 | 1 | 14 | 19 |
| Means .... | 15·95 | 14·60 | — | — | | | 1 | 16 | 0 |

*Oat Crops.*—Part of fields Nos. 1 and 3, consisting of land the most of which was in wheat last year, a little in oats, and the remainder new land, to the extent of about 50 acres, was ploughed between February 28th and April 17th for oats. It was harrowed before the end of April, and again after the drill. From May 1st to May 4th 60lbs. Algerian oats and 1cwt. superphosphate were drilled in to the acre on the whole piece.

These oats when harvested produced 1,987bush. 20lbs. from 49.90 acres, for an average of 39bush. 33lbs. per acre.

*Wheat Crops.*—No grain was harvested from last year's crop, the whole being cut for hay, so for the present season fresh seed had to be obtained. Most of this new seed consisted of pure-bred selected varieties from Roseworthy Agricultural College. This seed gives us a good start in the production of seed wheat, which is one of the things that can be done with great advantage on Eyre's Peninsula. It is very gratifying that for this, the first year that we could supply good seed from this farm, the demand far exceeded the supply, and every grain fit for seed over and above our own requirements has been sold. The wheat varieties were grown on land in three different states—some on new land fallowed in 1915, some on new land not fallowed, and the remainder on 1915 stubbles. The returns, showing where grown, are to be found in the following table:—

*Wheat Variety Yields.—Minnipa*, 1916.

| Variety. | Field Grown. | Area. | Total Yield. | | Yield per Acre. | |
|---|---|---|---|---|---|---|
| *New land, fallowed* 1915— | | Acres. | Bush. | lbs. | Bush. | lbs. |
| Caliph .. .. .. .. .. | No. 2 | 11.87 | 427 | 4 | 35 | 59 |
| King's Red .. .. .. | Nos. 1, 2, 3 | 14.12 | 495 | 22 | 35 | 5 |
| Queen Fan .. .. .. | No. 2 | 3.34 | 115 | 13 | 34 | 30 |
| College Eclipse .. .. | No. 2 | 8.42 | 280 | 18 | 33 | 17 |
| Means for fallowed land .. .. .. | | 37.75 | 1317 | 57 | 34 | 55 |
| *New land*— | | | | | | |
| Gluyas .. .. .. .. .. | No. 13 | 25.28 | 624 | 9 | 24 | 41 |
| *Stubble land*— | | | | | | |
| Eclipse .. .. .. .. .. | Nos. 1, 2 | 35.78 | 1059 | 37 | 29 | 37 |
| King's Red .. .. .. | Nos. 1, 2 | 20.53 | 583 | 21 | 28 | 25 |
| College Eclipse .. .. | No. 2 | 1.75 | 49 | 19 | 28 | 11 |
| Baroota Wonder .. .. | No. 1 | 37.98 | 1048 | 27 | 27 | 36 |
| Queen Fan .. .. .. .. | No. 2 | 0.285 | 7 | 25 | 26 | 1 |
| Gluyas .. .. .. .. .. | No. 1 | 12.37 | 217 | 51 | 17 | 37 |
| Means for stubble land .. .. .. | | 108.70 | 2966 | 0 | 27 | 17 |
| Farm average .. .. .. .. .. .. .. | | 171.73 | 4908 | 6 | 28 | 35 |

The land carrying the above varieties was cultivated as follows:—

*Bare Fallow.*—Ploughed from July 28th to August 13th; cultivated October 21st to 25th, and again May 4th to 8th; harrowed January 4th-5th; seed drilled in with 1cwt. superphosphate to the acre May 12th to 17th, and harrowed straight away.

*New Land.*—Ploughed from April 27th to 29th; cultivated April 27th-29th, and again from June 3rd to 7th; seed drilled in from June 6th to 8th, and immediately harrowed.

*Stubble Land.*—Ploughed from February 28th to April 17th; harrowed April 27th to May 12th; oats drilled in with 1cwt. superphosphate from May 1st to 4th; Baroota Wonder Wheat drilled in with 1cwt. superphosphate from May 30th to June 3rd. Remainder of land cultivated June 7th to 13th, and drilled in with 1cwt. superphosphate to the acre from June 10th to 14th. All harrowed after drilling.

### Experimental Plots.

On new land in field No. 13 a series of manurial plots with Gluyas wheat was conducted. The plots were drilled in from June 6th to 8th with 65lbs. Gluyas wheat to the acre, with the following results:—

*Manurial Tests with Gluyas Wheat.—Minnipa,* 1916.

| Manuring per Acre. | Area. | Total Yield. | | Yield per Acre. | |
|---|---|---|---|---|---|
| | Acres. | Bush. | lbs. | Bush. | lbs. |
| No manure | 3.598 | 71 | 45 | 19 | 56 |
| ½cwt. superphosphate | 3.539 | 81 | 7 | 22 | 55 |
| 1cwt. superphosphate | 4.046 | 97 | 49 | 24 | 11 |
| 2cwts. superphosphate | 4.418 | 126 | 15 | 28 | 35 |

The remainder of this field—making the area 25.28 acres—was sown to Gluyas wheat with 1cwt. superphosphate per acre, and averaged 25bush. 33lbs. per acre. The whole field was very badly lodged, and the manager of the farm (Mr. L. J. Cook) estimates the loss through this cause to be quite 2 bags to the acre, with the heavier manured plots as proportionately the greatest sufferers

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# POULTRY.

## THE GREAT IMPORTANCE OF DRINKING WATER FOR LAYING HENS.

*Investigations made in the Poultry Laboratory, Department of Agriculture, S.A.*

[By D. F. Laurie, Poultry Expert.]

(Weights and measurements determined by C. F. Anderson, Assistant.)

During a number of years the egg of the domestic hen has been constantly studied in elucidating many points. Various theories have from time to time gained currency, and in testing these, and in making other investigations, much valuable data is available. The study of evaporation of the water content of eggs is of commercial importance. Much work in connection with the behaviour of eggs undergoing cold storage has been carried out by this Department. The question of loss of weight is highly important from a commercial standpoint. From a physiological point of view its significance is very great. It requires no great amount of reasoning to understand that in a newly-laid egg the water content is in the precise proportion necessary for the elaboration of a perfect chicken. Consideration of the facts governing enzyme action, and their nature, leads to the inevitable conclusion that loss of moisture means concentration of solutions of salts with grave alterations to, and perhaps destruction of, various cells due to osmosis. Practical experience shows that stale eggs, as a rule, either fail to hatch or produce weaklings. One reads all sorts of statements concerning the proportion of one part of an egg to another, and with the intention of informing poultry breeders as to the facts of the case a series of studies on this point have been completed. It is a noteworthy fact that I have never met a merchant who knew what the percentage of loss on a given number of eggs was represented by the weight of the shell. Yet that is a matter of elementary importance to a keen trader. In the Tables I., II., III., it will be seen that the mean weight of dried shell is 8.7 per cent. of the whole weight of the egg. In trade, either when using eggs for cake-making or in pulping eggs for cold storage or export, the loss on 100 tons of eggs would, with adherent egg white, amount to 11 or 12 tons.

## COMPOSITION OF HEN EGGS.

Although the present investigations are not concerned with the analysis of the contents of hen eggs, it is of interest to breeders to know something of the average composition of eggs. (Taken from Simon.)

*General Composition of the Yolk.*—Water, 47.19 to 51.49 per cent.; solids, total, 48.51 to 42.81 per cent., consisting of—Fats (olien, palmitin, and stearin), 21.30 to 22.84 per cent.; vitellin and other albumins, 15.63 to 15.76; lecithin, 8.43 to 10.72; cholesterin, 0.44 to 1.75; cerebrin, 0.30 to 0.36; mineral salts, 3.33; coloring matters and glucose, 0.553.

*General Composition of the White of Eggs.* (N.B.—Albumen is a misnomer, strictly speaking, on account of the glucose content.)—Water, 80.00 to 86.68 per cent.; solids, 13.22 to 20.00, consisting of—Albumins, 11.50 to 12.27; extractives, .38 to .77; glucose, .10 to .50; fats and soaps, traces; mineral salts, .30 to .66; lecithins and cholesterin, traces.

The shell consists of an organic matrix similar to keratin (one of the a-proteins) impregnated with lime salts. Of these calcium (lime), and magnesium carbonates average 97 per cent.; the phosphate of these minerals, about 1 per cent., a trace of iron, and keratin and moisture 2 per cent. Both membranes lining the shell are also composed of keratin.

The data obtained, as shown in tables I., II., III., were from three lots, each of 12 eggs, White Leghorn, Barred Plymouth Rock, and Rhode Island Red. The eggs were laid in the single testing pens at the Government Poultry Station, Parafield. The eggs were laid by pullets undergoing tests for egg production and size of egg. These eggs were selected at random.

As will be seen on reference to the tables the eggs were first of all weighed with great accuracy on a "Becker" balance. They were then boiled for 10 minutes and again weighed to show loss during boiling, and to help breeders to understand that immersion in water does not add to the moisture content of the egg.

As soon as the eggs were cool the shell was carefully stripped and every particle placed on a watch glass and subsequently weighed, air dried. The white was carefully stripped from the hardened yolk but was not weighed. Each yolk was carefully weighed as shown. The weight, by difference, gives the weight of the white, and of moisture lost at time of weighing.

*Weight of egg before boiling.* In the single testing work at Parafield no pullet is retained for subsequent use as a breeding hen unless her eggs average 2ozs. (56.689gr.) and over. Nos. 1, 3, and 4, White Leghorns (Table I.) are shown to be slightly under the standard weight, but several previous weighings of eggs laid by these pullets showed satisfactory results. The numbers are laboratory numbers, and do not refer to the pen numbers in the poultry station breeding records. The shells of all eggs were strong and dense—birds laying eggs with weak shells are discarded. A theory was brought forward some years ago alleging that in a batch of eggs laid by a hen there is always a rise in weight until a maximum is reached, when a gradual decline in weight takes place. It may be of interest to state that after weighing all the eggs laid by some 20 remarkably consistent layers, and during a period of many months, I could find no proof whatever of this ingenious theory.

## LACK OF SUFFICIENT DRINKING WATER.

What I did find on numerous occasions was proof of the great importance of a constant supply of cool clean water for the birds. I found that on warm days, unless ample cool water was available, there was a great fall in the weight of the egg laid by each bird so situated.

I gave the composition of the egg to emphasize its water content, and incidentally the importance to the fowl of an ample water supply. The supply must be constant, not intermittent. It is not sufficient to give the birds a full drink at intervals—the water must be available when the birds require it. Ducks, and more especially ducklings, are disastrously affected by want of water, and although the losses among adult fowls and chickens are not so apparent, yet much damage must result. Ducks lose weight rapidly—moisture loss—if deprived of water even for a few hours. Ducklings, if allowed to become thirsty and then to have access to water, are seriously affected and generally die. The brain and nerve centres are affected.

*Loss during Boiling.*—It will be noted on reference to Table I., White Leghorn eggs, that the loss in this case has no relation to the weight of the egg. The lightest egg, No. 3, lost more weight than the heaviest egg, No. 10. Egg No. 11, which was a fair-sized egg, shows the least loss during boiling. No. 4, a light egg, lost over 4 per cent. As far as could be seen on careful examination of the various shells there was no difference in porosity. The average loss in weight during boiling was 2.723 per cent.

Reference to Table II., Plymouth Rock eggs, shows that the lightest egg, No. 2, lost more moisture than egg No. 11, which is 8 grammes heavier. The loss during boiling averages 2.631 per cent., which is less than in the case of the White Leghorn eggs, Table I. The White Leghorn eggs were all pure white, no tint. The Plymouth Rock and Rhode Island Red eggs were tinted, some deeply. When we inspect Table III., Rhode Island Red eggs, we find a surprising difference, as there the average loss in weight during boiling is only .788, or in the neighborhood of 25 per cent. of the loss in the White Leghorn and Rock eggs. The ratio of the weight of the average shell of the egg of each breed to the total weight of the egg does not throw any light upon this point.

*Weight of Yolk.*—Here again we are confronted with seeming anomalies. Egg No. 3, White Leghorn, Table I., is the lightest, yet its yolk is 38.124 per cent. of the whole egg, and 8 per cent (approximately) more than in the case of egg No. 10 weighing 4½ grammes more.

In Table II., Plymouth Rock eggs, we see the yolk of the lightest egg, No. 2, is 33.213 per cent., as against 27.819 per cent. for the heaviest egg, No. 10.

Referring to Table III., Rhode Island Red, it is seen that there is a general proportion in the percentage weight of the yolk to the whole egg.

*The Percentage Weights of the Yolk to Whole Egg.*—Table I., White Leghorn, average 32.211; Table II., Plymouth Rocks, average 31.706; Table III., Rhode Island Reds, average 31.239.

*Weight of Shell.*—Table I., White Leghorn. The heaviest egg, No. 10, has the lightest shell, *i.e.,* the percentage weight of shell to the whole egg. Table II., Barred Plymouth Rocks. The lightest egg, No. 2, has a shell which is 9.071 per cent. of the weight of the egg as compared with the heaviest egg, No. 10, of which the shell weighs only 8.991 per cent. Table III., Rhode Island Red, does not show any marked feature. The average percentage weight of the egg shell in Table I., White Leghorn, is 9.013; Table II., Barred Rocks, is 8.478; Table III., Rhode Island Reds, is 8.697. These percentage weights would, at first glance, refute the statements generally current that the shells of Plymouth Rocks and Rhode Island Reds are denser than those of White Leghorns. Here it is a question of weight only—not of porosity.

*Weight of Egg White.*—As previously stated in the experiments shown in Tables I., II., and III., the coagulated whites were not weighed. The last two columns show, by difference, the weight and weight per cent. of egg white and moisture lost from yolks, shell, and egg white. Here there is close agreement with the original weight of the egg. It proves, I think beyond doubt, that the principal factor in the percentage weight of the various parts of the egg is the moisture held in chemical combination. The moisture content of the yolk is derived from the ovary and its various vessels. The moisture of the egg white, membranes and shell are derived from the secreting glands in the oviduct. There is reason to believe that there is a final addition to the egg white in the uterus portion of the duct, and a pathological condition due to thirst, hot weather, &c., would considerably influence the egg and its parts.

### TABLE IV.

After reviewing the data resulting from the compilation of Tables I., II., and III. it was decided to go further into the question, and for that purpose six White Leghorn and six Rhode Island Red eggs from the same source as in Tables I., II., and III. were selected at random. These eggs were carefully measured in their longest and shortest axes. Micrometer callipers were used, and the measurements verified personally.

The coagulated egg whites of all these eggs were carefully weighed, and extreme accuracy was observed. The egg white of the eggs in Tables I., II., and III. were not weighed separately. After boiling they were again weighed. One egg, No. 5, was cracked during the process, and showed a gain of .069 per cent. in weight. The yolks were lighter than in Tables I., II., and III., as will be seen by the percentage results. The shells were heavier than those in the other tests.

*Egg White.*—The average weight per cent. of the whole egg is shown to be 54.328. It will be noticed that Nos. 2 and 4 had the heaviest whites and small yolks. The loss in weight, due to moisture, and the column showing the percentage of such loss, do not help in any way to connect evaporation with weight of egg shell.

## SUMMARY.

From these four tables it must be concluded that the most accurate measurements and weighings do not afford any data from which a general rule can be derived. From the 48 eggs used in the experiments we have ascertained with extreme accuracy certain important facts, viz.:—

1. The loss in weight during a process of boiling for 10 minutes. It would be interesting to analyse the water in which the eggs were boiled.
2. The weight of the yolk of each egg and the average weight per cent. Probably some of the oils of the yolk are volatile.
3. The weight of the shell of each egg and the percentage of weight of shell to the whole egg.
4. In Table IV. the weight of coagulated egg white is shown, and the percentage of weight of whole egg.

## CONCLUSIONS.

In this and other experiments it has been shown that eggs vary in the weights of the various parts. Other experiments made have confirmed the well known fact that the eggs of individual hens vary considerably, not only within short spaces of time, but also to some extent seasonally. The figures showing these facts are recorded, but for consideration of space are not published now.

All the birds concerned in these tests were in excellent health and were scientifically fed. No consideration need be given to the effects of under feeding, either as regards quantities or quality of food. No sane person expects hens to lay profitably under such conditions.

Porous shells mean loss of weight through evaporation, but in these tests the eggs were fresh. For commercial reasons it behoves breeders to lay stress on the importance of strong, hard shells.

The chief conclusion I arrive at is that a constant, available supply of fresh, clean drinking water is not only the factor responsible for limiting many deviations from average weight, but that it is a factor of vital importance in the wellbeing of the future chicken.

It is not sufficient to provide drinking water. It must be readily accessible, ample in supply, and it must be kept cool.

## TABLE I.—WHITE LEGHORN EGGS.

WEIGHTS IN GRAMMES.

| No. | Weight Before Boiling. | Weight After Boiling. | Loss in Weight Per Cent. | Weight of Yolk. | Per Cent. Weight of Yolk of Whole Egg. | Weight of Shell. | Per Cent. Weight of Shell of Whole Egg. | Weight by Difference of White and Moisture. | Pe Cent. Weight of Whole Egg of White and Moisture. |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 56·050 | 54·475 | 2·809 | 17·652 | 32·404 | 4·285 | 7·866 | 32·538 | 59·730 |
| 2 | 57·235 | 55·579 | 2·893 | 16·675 | 30·003 | 5·050 | 9·086 | 33·854 | 60·911 |
| 3 | 55·510 | 53·929 | 2·848 | 20·560 | 38·124 | 4·089 | 7·582 | 29·280 | 54·294 |
| 4 | 55·615 | 53·365 | 4·045 | 16·582 | 31·073 | 4·870 | 9·126 | 31·913 | 59·801 |
| 5 | 56·050 | 54·515 | 2·738 | 19·130 | 35·091 | 5·270 | 9·6[illegible]7 | 30·115 | 55·[illegible]42 |
| 6 | 57·325 | 55·749 | 2·749 | 17·038 | 30·562 | 4·802 | 8·614 | 33·909 | 60·824 |
| 7 | 58·905 | 57·571 | 2·264 | 17·100 | 29·702 | 5·680 | 9·866 | 34·791 | 60·432 |
| 8 | 56·705 | 55·091 | 2·846 | 17·927 | 32·541 | 5·227 | 9·488 | 31·937 | 57·971 |
| 9 | 57·425 | 55·995 | 2·490 | 17·647 | 31·516 | 5·985 | 10·688 | 32·363 | 57·796 |
| 10 | 60·005 | 58·360 | 2·741 | 17·757 | 30·427 | 4·760 | 8·156 | 35·843 | 61·417 |
| 11 | 57·405 | 56·392 | 1·764 | 18·869 | 33·460 | 5·595 | 9·922 | 31·928 | 56·618 |
| 12 | 58·905 | 57·435 | 2·495 | 18·169 | 31·634 | 4·645 | 8·087 | 34·621 | 60·279 |
| Averages...................... | | | 2·723 | | 32·211 | | 9·013 | | 58·776 |

## TABLE II.—PLYMOUTH ROCK EGGS.

WEIGHTS IN GRAMMES.

| No. | Weight Before Boiling. | Weight After Boiling. | Loss in Weight Per Cent. | Weight of Yolk. | Per Cent. Weight of Yolk of Whole Egg. | Weight of Shell. | Per Cent. Weight of Shell of Whole Egg. | Weight by Difference of White and Moisture. | Per Cent. Weight of Whole Egg of White and Moisture. |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 58·305 | 56·830 | 2·529 | 20·350 | 35·809 | 4·947 | 8·705 | 31·533 | 55·486 |
| 2 | 55·310 | 53·765 | 2·793 | 17·857 | 33·213 | 4·877 | 9·071 | 31·031 | 57·716 |
| 3 | 62·905 | 61·340 | 2·487 | 18·882 | 30·782 | 5·570 | 9·081 | 36·888 | 60·137 |
| 4 | 57·325 | 55·970 | 2·363 | 18·177 | 32·477 | 4·320 | 7·718 | 33·473 | 59·805 |
| 5 | 57·810 | 56·205 | 2·766 | 16·280 | 28·965 | 4·420 | 7·864 | 35·505 | 63·171 |
| 6 | 58·365 | 57·027 | 2·292 | 17·950 | 31·476 | 5·469 | 9·591 | 33·608 | 58·933 |
| 7 | 59·600 | 58·227 | 2·303 | 18·205 | 31·266 | 5·169 | 8·877 | 34·853 | 59·857 |
| 8 | 60· 50 | 58·855 | 3·278 | 20·015 | 34·008 | 4·509 | 7·661 | 34·331 | 58·331 |
| 9 | 61·937 | 60·415 | 2·457 | 18·720 | 30·986 | 4·307 | 7·129 | 37·388 | 61·885 |
| 10 | 66·180 | 64·200 | 2·991 | 17·860 | 27·819 | 5·772 | 8·991 | 40·568 | 63·190 |
| 11 | 63·832 | 62·200 | 2·556 | 19·077 | 30·671 | 5·949 | 9·564 | 37·174 | 59·765 |
| 12 | 58·050 | 56·450 | 2·756 | 18·629 | 33·001 | 4·225 | 7·484 | 33·596 | 59·515 |
| Averages………………… | | | 2·631 | | 31·706 | | 8·478 | | 59·816 |

## TABLE III.—RHODE ISLAND RED EGGS.

WEIGHTS IN GRAMMES.

| No. | Weight Before Boiling. | Weight After Boiling. | Loss in Weight Per Cen . | Weight of Yolk. | Per Cent. Weight of Yolk of Whole Egg. | Weight of Shell | Per Cent. Weight of Shell of Whole Egg. | Weight by Difference of White and Moisture. | Per Cent. Weight of Whole Egg of White and Moisture. |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 58·455 | 58·020 | ·744 | 18·610 | 32·075 | 4·770 | 8·222 | 34·640 | 59·703 |
| 2 | 57·579 | 57·040 | ·936 | 16·500 | 28·927 | 5·470 | 9·590 | 35·070 | 61·483 |
| 3 | 57·465 | 56·869 | 1·037 | 17·879 | 31·439 | 4·805 | 8·449 | 34·185 | 60·112 |
| 4 | 56·670 | 56·280 | ·688 | 16·260 | 28·891 | 4·610 | 8·191 | 35·410 | 62·918 |
| 5 | 58·285 | 57·885 | ·686 | 18·225 | 31·485 | 5·349 | 9·241 | 34·311 | 59·274 |
| 6 | 62·560 | 61·950 | ·975 | 19·145 | 30·904 | 5·075 | 8·192 | 37·730 | 60·904 |
| 7 | 59·040 | 58·705 | ·567 | 18·555 | 31·607 | 5·685 | 9·684 | 34·465 | 58·709 |
| 8 | 59·327 | 58·500 | 1·394 | 18·820 | 32·170 | 4·950 | 8·462 | 34·730 | 59·368 |
| 9 | 59·467 | 59·125 | ·575 | 19·570 | 33·099 | 5·585 | 9·446 | 33·970 | 57·455 |
| 10 | 56·687 | 5 ·365 | ·568 | 17·730 | 31·456 | 4·795 | 8·507 | 33·840 | 60·037 |
| 11 | 59·305 | 59·070 | ·396 | 18·655 | 31·582 | 4·495 | 7·601 | 35·920 | 60·809 |
| 12 | 56·575 | 56·065 | ·901 | 17·510 | 31·232 | 4·915 | 8·766 | 33·640 | 60·002 |
| Averoges........................ |  |  | ·788 |  | 31·239 |  | 8·697 |  | 60·064 |

## TABLE IV —SPECIALS.

WEIGHTS IN GRAMMES. MEASUREMENTS IN MILLIMETERS.

| No. | Measurement before Boiling. | | Weight Before Boiling. | Weight After Boiling. | Loss in Weight Pr. Cnt. | Weight of Yolk. | Weight Per Cent. of Egg. | Weight of White. | Weight Per Cent. of Egg. | Weight of Shell. | Weight Per Cent. of Egg. | Loss of Weight in Moisture. | Loss per Cent. in Moisture. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Lngth. | Brdth. | | | | | | | | | | | |
| 1 | 57·1 | 45·5 | 65·200 | 64·434 | 1·174 | 20·630 | 32·017 | 35·157 | 54·563 | 6·140 | 9·529 | 2·507 | 3·891 |
| 2 | 58·0 | 41·0 | 54·767 | 53·575 | 2·176 | 15·675 | 29·258 | 30·735 | 57·368 | 4·935 | 9·211 | 2·230 | 4·163 |
| 3 | 55·5 | 44·8 | 62·530 | 61·395 | 1·815 | 18·200 | 29·645 | 34·720 | 56·552 | 6·280 | 10·228 | 2·195 | 3·575 |
| 4 | 56·3 | 43·3 | 56·585 | 56·275 | ·054 | 15·940 | 28·325 | 32·315 | 57·423 | 5·515 | 9·800 | 2·505 | 4·452 |
| *5 | 55·6 | 43·0 | 56·805 | 57·200 | ·069<br>gain | 18·225 | 31·861 | 28·650 | 50·087 | 5·247 | 9·174 | 5·078 | 8·878 |
| 6 | 58·1 | 43·3 | 60·000 | 59·380 | 1·033 | 18·805 | 31·668 | 30·800 | 51·869 | 6·130 | 10·324 | 3·645 | 6·139 |
| 7 | 57·7 | 41·8 | 54·660 | 53·855 | 1·472 | 16·830 | 31·250 | 29·835 | 55·399 | 5·125 | 9·516 | 2·065 | 3·835 |
| 8 | 55·2 | 42·9 | 55·230 | 54·739 | ·088 | 15·900 | 29·046 | 30·305 | 55·363 | 5·595 | 10·222 | 2·939 | 5·369 |
| 9 | 58·3 | 43·0 | 60·300 | 59·220 | 1·791 | 19·800 | 33·434 | 31·032 | 52·401 | 6·105 | 10·310 | 2·283 | 3·855 |
| 10 | 56·0 | 42·3 | 54·320 | 53·600 | 1·325 | 17·660 | 32·947 | 28·550 | 53·265 | 5·405 | 10·084 | 1·985 | 3·704 |
| 11 | 58·8 | 44·4 | 62·165 | 61·790 | ·060 | 18·850 | 30·506 | 32·720 | 52·954 | 5·650 | 9·144 | 4·570 | 7·396 |
| 12 | 56·1 | 42·7 | 57·000 | 56·217 | 1·373 | 17·950 | 31·929 | 30·750 | 54·699 | 5·545 | 9·864 | 1·972 | 3·508 |
| Averages.................. | | | | | 1·030 | | 30·991 | | 54·328 | | 9·784 | | 4·897 |

* Cracked while boiling.

# ROSEWORTHY AGRICULTURAL COLLEGE.

## HARVEST REPORT, 1916-17.

[By W. J. Colebatch, B.Sc. (Agric.), M.R.C.V.S., Principal Roseworthy Agricultural College.]

### GENERAL REMARKS.

The College harvest in 1916-17 ranks second in magnitude to the magnificent season of 1909. Broadly speaking, farming operations have been eminently successful in every department, and the contented condition of the livestock reflects the character of the growth in pasture and cropped field. It has taxed our ingenuities to solve the many difficulties that the harvest presented, not the least important of which was the lack of spare hands to cope with the rush of work at the junction of the hay and grain harvests. Ultimately, however, the task was completed, and, as indicating the amount of work involved, it may be stated that there were carted over the weighbridge during the season 165 tons of berseem clover, 103 tons of cereal ensilage, 375 tons of hay, 200 tons of straw, and 10,786bush. of grain.

There were in all 638·059 acres harvested, and, with a view to ensuring abundant returns, the great bulk of that area was devoted to varieties known to be reliable yielders. The demand for late mid-season wheats this season has been very keen, and our supply was quickly exhausted. However, next season we hope to have available larger stocks of those varieties that are in demand in districts dis-similar to ours in regard to soil and climate.

The weather during the harvest was on the whole favorable to the work, and this enabled us to complete operations in good time.

### WEATHER CONDITIONS.

The salient features of the year 1915 were the early autumn rains, the very wet mild winter, and the late moist spring and summer. The first seeding rains fell earlier in this district than in most of the wheat-growing regions north of Adelaide, and in consequence our cereal crops were further forward when the winter set in. We were unable to graze them off, however, as no less than 7·93in. of rain were registered in June and July, there being 38 wet days in the two months. The dangers to be feared with crops going into the spring in this luxuriant state are frosts at flowering time, heavy winds and driving spring rains causing the crop to lodge, blighting off of the heads, and shrivelling of the grain in the event of an early summer, and finally depreciated returns through the attacks of red rust.

With regard to frosts, it may be remarked that the season on the whole was singularly free from a succession of very low temperatures. The heaviest frost experienced was on October 18th, when the thermometer fell to 32° F. This wrought havoc amongst the vines, but owing to the lateness of the season the cereal crops escaped harm. In addition, there were three mild frosts in June and one in July, but these were more beneficial than injurious in their effects.

All fears of shrivelled grain and blighted heads were ultimately dispelled by the regular succession of showers in October and November, but in the early part of September the prospects of an early summer appeared all too imminent. During the first three weeks of that month there was practically no rain at all, and the soft watery growth was being subjected to shade temperatures of from 75° to 85° Fahr., which it certainly did not appreciate. Our anxieties, however, were removed by the timely arrival of over 1⅜in. of refreshing rain between the 21st and 24th of the month. Fortunately the late spring and early summer months were not accompanied by close muggy weather which is so favorable to the germination of spores and the spread of fungoid diseases, such as red rust (*Puccinia graminis*). This is a matter to be thankful for, as the overgrown wheat crops of 1915 could have offered but little resistance to fungoid invasion.

It is seen, therefore, that we succeeded in escaping three out of the four chief dangers to be feared at the end of the winter. The fourth risk we certainly did not manage to evade ; in fact, we have never known in the history of the College a year in which the wheat crops lodged so flat on the ground as they did this harvest. In an early district like ours, where chief reliance must be placed on early varieties, it is not an infrequent occurrence for us to have to contend with " down " crops, and consequently we are not easily dismayed by the sight of storm-beaten wheat fields. In this instance, however, the weakness of the straw fibres, the weight of grain in the well-filled ears, and the incessant rain storms and high winds during October and November combined to force the crops on to the ground and counteract their efforts to recover again.

The great bulk of straw and flag, and the very tangled character of many of these beaten crops added very considerably to the harvesting difficulties ; but, although in some instances appreciable losses were sustained, these were frequently due to the crop being allowed to lie long enough for the straw to lose its toughness. In most cases, where the crops were tackled within a reasonable time after the grain had ripened, the mechanical appliances now available were found to meet the needs of the situation.

Table I.—*Showing Monthly Rainfall at Roseworthy College for Seasons* 1912-1916 *inclusive, together with the Mean Fall for each Month during the period* 1883-1915 (33 *years*).

| | 1912.<br>Inches. | 1913.<br>Inches. | 1914.<br>Inches. | 1915.<br>Inches. | 1916.<br>Inches. | Means, 1883/1915<br>Inches. |
|---|---|---|---|---|---|---|
| January | 0·09 | 0·11 | 0·27 | 0·81 | 1·15 | 0·81 |
| February | 0·21 | 1·94 | 1·62 | 0·04 | 0·16 | 0·56 |
| March | 0·70 | 1·63 | 0·73 | 0·30 | 0·62 | 0·88 |
| April | 0·91 | 0·31 | 1·38 | 1·95 | 1·36 | 1·69 |
| May | 0·19 | 0·31 | 0·94 | 3·01 | 0·88 | 1·76 |
| June | 1·68 | 0·22 | 0·45 | 4·61 | 5·18 | 2·56 |
| July | 1·87 | 0·69 | 1·32 | 1·89 | 2·75 | 1·85 |
| August | 3·19 | 1·64 | 0·39 | 1·83 | 3·00 | 2·02 |
| September | 2·43 | 2·55 | 0·29 | 3·56 | 1·82 | 1·82 |
| October | 0·94 | 3.89 | 0·08 | 1·27 | 1·65 | 1·64 |
| November | 1·84 | 1·21 | 1·27 | 0·21 | 3·61 | 1·03 |
| December | 0·92 | 1·16 | 0·62 | 0·28 | 1·05 | 0·77 |
| Totals | 14·97 | 15·66 | 9·36 | 19·76 | 23·23 | 17·41 |

Table II.—*Showing the Distribution of "Useful Rain" in the Years* 1912-1916 *inclusive, together with the Means for the previous* 33 *Years.*

| | 1912.<br>Inches. | 1913.<br>Inches. | 1914.<br>Inches. | 1915.<br>Inches. | 1916.<br>Inches. | Means. 1883-1915.<br>Inches. |
|---|---|---|---|---|---|---|
| Seeding rains (April-May) | 1·10 | 0·62 | 2·32 | 4·96 | 2·24 | 3·45 |
| Winter rains (June-July) | 3·55 | 0·91 | 1·77 | 6·50 | 7·93 | 4·41 |
| Spring rains (August-October) | 6·56 | 8·08 | 0·76 | 6·66 | 6·47 | 5·49 |
| Summer rains (November) | 1·84 | 1·21 | 1·27 | 0·21 | 3·61 | 1·03 |
| Totals | 13·05 | 10·82 | 6·12 | 18·33 | 20·25 | 14·38 |
| Percentage useful rain to total fall | 87·17 | 69·09 | 65·38 | 92·76 | 87·17 | 82·60 |

Table III.—*Showing Particulars of Weather experienced at Roseworthy College during the Year* 1916.

| | Rainfall. Inches. | No. of days on which rain fell | Important Rains. | | Minimum temprdeg. Fahr. | Mean minimum temprdeg. Fahr. | Frosts. | | Max. tempr. deg. Fahr. | Mean max. tem. degs. Fahr. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Date. | Inches. | | | Date. | Temp. | | |
| January | 1·15 | 5 | 4 | ·80 | 45·3 | 58·9 | — | — | 110 | 89·4 |
| February | ·16 | 2 | 9 | ·13 | 48·0 | 58·9 | — | — | 108·7 | 88.9 |
| March | ·62 | 2 | 7 | ·48 | 45·1 | 52·7 | — | — | 105 | 83·3 |
| April | 1·36 | 11 | 5/7 | ·24 | 41·0 | 49·34 | — | — | 85·3 | 69·56 |
| | | | 12/13 | ·24 | | | | | | |
| | | | 21 | ·33 | | | | | | |
| | | | 25/28 | ·51 | | | | | | |
| May | ·88 | 6 | 14/17 | ·29 | 37·0 | 47·24 | 6 | 37·0 | 84·0 | 68·52 |
| | | | 30/31 | ·58 | | | | | | |
| June | 5·18 | 22 | 3 | ·77 | 36·4 | 45·61 | 15 | 38·2 | 64·8 | 58·43 |
| | | | 5 | ·24 | | | 16 | 38·0 | | |
| | | | 20/30 | 3·64 | | | 17 | 36·6 | | |
| July | 2·75 | 16 | 7/10 | ·63 | 35·0 | 44·1 | 2 | 35·0 | 65·0 | 58·2 |
| | | | 17/20 | 1·10 | | | | | | |
| | | | 26/30 | ·87 | | | | | | |

TABLE III.—*Showing Particulars of Weather experienced at Roseworthy College during the Year* 1916—continued.

| | Rainfall. Inches. | No. of days on which rain fell. | Important Rains. | | Minimum tempr deg. Fahr. | Mean minimum tempr. deg. Fahr. | Frosts. | | Max. tempr. deg. Fahr. | Mean max. tem. degs. Fahr. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Date. | Inches. | | | Date. | Temp. | | |
| August ............. | 3· 0 | 21 | 2/8 | 1·27 | 37·0 | 43·11 | — | — | 73·8 | 59·96 |
| | | | 12/16 | ·83 | | | | | | |
| | | | 18 | ·20 | | | | | | |
| | | | 20/22 | ·27 | | | | | | |
| | | | 26/30 | ·43 | | | | | | |
| September .......... | 1·82 | 7 | 21/24 | 1·78 | 34·5 | 46·69 | — | — | 88·3 | 67·80 |
| October .............. | 1·65 | 13 | 4/5 | ·21 | 32·0 | 45·24 | 14 | 34·7 | 84·0 | 66·88 |
| | | | 8/9 | ·45 | | | 18 | 32·0 | | |
| | | | 22/23 | ·68 | | | 27 | 36·7 | | |
| November ............ | 3·61 | 13 | 4/7 | 1·08 | 41·2 | 50·44 | — | — | 89·3 | 69·72 |
| | | | 11/17 | 1·81 | | | | | | |
| | | | 24/25 | ·72 | | | | | | |
| December ............ | 1·05 | 9 | 11/14 | ·82 | 40·8 | 55·23 | — | — | 108·8 | 82·26 |
| Totals........ | 23·23 | 127 | | | | | 8 Frosts | | | |

The total rainfall for 1915—23·23in.—has been exceeded on four previous occasions since 1883, namely in 1890 (27·58in.), 1889 (25·74in.), 1909 (24·05in.), and 1910 (23·87in.). With regard to "useful rain" this season's figures—20·25in.—were beaten in 1889 (22·67in.), 1909 (21·15in.), 1893 (20·39in.), and were closely approximated in 1883 (20·17in.).

By comparison with the mean precipitation for the preceding 33 years we notice that last year's fall is 5·82in. above the normal, and the whole of the increase fell within the period covered by the term "useful rain." Two new monthly records were established, the June fall of 5·18in. being ·57 of an inch better than the previous highest, whilst the November total—3·61in. —was ·45 of an inch above the 1903 record.

In reviewing the distribution of the year's precipitation over the different seasons we are struck immediately by the heavy falls registered in the winter months. We have to go back to 1890 to find a similar distribution. In that year the winter rains were even heavier, being 8·39in. as against 7·93in. in 1915. The summer rainfall (November), it has already been shown, exceeded all previous records, but the autumn and spring falls were not far removed from the mean figures for the corresponding periods over the preceding third of a century.

The effect of the summer showers was to lengthen the ripening period and fill out the ears and grain. The mean maximum temperatures during October and November were remarkably low, and the extreme readings of the thermometer during the same two months did not rise above 89·3° F. Thus the crops were given an opportunity of maturing their grain under conditions more akin to those that prevail in the south of England, and in consequence we find that some extraordinarily high yields are being obtained, and we ourselves have succeeded in harvesting approximately 50bush. per acre from one of our experimental plots.

In general, then, it may be stated that the season 1915 provided an ideal seeding season, a surplus of winter rains, an adequate supply of spring and summer rains which were accompanied by excessive and damaging winds, and lastly, a series of relatively low summer temperatures which ensured a plentiful harvest.

## BERSEEM CLOVER.

Ever since 1911 a portion of the area reserved for irrigation has been devoted to berseem clover, and in our experience under Roseworthy conditions it is without a rival as a producer of nutritious green feed during the winter and spring.

We recognise, however, that in order to obtain maximum results with this crop it is absolutely essential to observe the following rules:—

1. The land must receive a dressing of 12 to 14 tons of farmyard manure per acre.
2. This must be spread and ploughed under not later than the middle of March. Depth of furrow 5in. to 6in.
3. Ploughed face to be rolled to a fine tilth and 2cwt. 36/38 grade superphosphate drilled in.
4. Surface rolled again and 30lbs. seed per acre broadcasted and pressed in with another turn of the roller.
5. Seeding to take place between 15th March and 15th April. The later the sowing the slower and less certain the germination.
6. Immediately after seeding give the seed bed a thorough irrigation.

This crop is so reliable at the College that it is difficult to understand why it does not receive more attention on the part of farmers. The yields per acre are very large, and consequently blocks of two to three acres would be found ample for most farmers. The crop needs no attention, except the application of water, and it is out of the road in ample time to make room for a summer crop such as maize, sorghum, or millet.

In the appended tables are shown the details of this season's yields and the annual and mean yields obtained at the College since it was introduced here.

Table IV.—*Showing Results of Berseem Harvest at Roseworthy College*, 1916.

| Plot. | Area. Acres. | Cut. | Date Cut. | Total Yield. | | | Yield per Acre. | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Tons | cwts. | lbs. | Tons | cwts. | lbs. |
| A, B ....... | 1·994 | 1st | May 22-July 4 .......... | 22 | 11 | 78 | 11 | 6 | 59 |
| | | 2nd | July 22- August 21 ...... | 14 | 19 | 67 | 7 | 10 | 28 |
| | | 3rd | September 14-October 4 .. | 19 | 6 | 48 | 9 | 13 | 89 |
| | | 4th | November 23-December 7 | 14 | 8 | 99 | 7 | 4 | 98 |
| | | | | 71 | 6 | 68 | 35 | 15 | 50 |

TABLE IV.—*Showing Results of Berseem Harvest, &c.*—continued.

| Plot. | Area. Acres. | Cut | Date Cut. | Total Yield. |  |  | Yield per Acre. |  |  |
|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  | Tons | cwts. | lbs. | Tons | cwts. | lbs. |
| L | 1·398 | 1st | June 19-July 9 | 13 | 4 | 2 | 9 | 8 | 96 |
|  |  | 2nd | August 22-September 8 | 14 | 19 | 22 | 10 | 14 | 2 |
|  |  | 3rd | October 5-November 4 | 15 | 17 | 76 | 11 | 7 | 27 |
|  |  | 4th | December 7-December 23 | 9 | 9 | 62 | 6 | 15 | 66 |
|  |  |  |  | 53 | 10 | 50 | 38 | 5 | 78 |
| M | 1·251 | 1st | June 29-July 1 | 11 | 5 | 80 | 9 | 0 | 48 |
|  |  | 2nd | September 9-September 22 | 14 | 13 | 84 | 11 | 14 | 91 |
|  |  | 3rd | November 6-November 23 | 14 | 4 | 102 | 11 | 7 | 84 |
|  |  |  |  | 40 | 4 | 42 | 32 | 2 | 111 |
| Totals | 4·643 |  |  | 165 | 1 | 48 | 35 | 11 | 6 |

Irrigation in dry years will be necessary after each cutting, but in wet seasons it may happen that the first watering is the only essential one. Obviously the number of subsequent irrigations will be determined by the rainfall. During last year the first soaking after seeding proved to be the only one required, and yet in Table IV. it is shown that we secured an average return of 35 tons 11cwt. 6lbs. to the acre, thereby beating our previous record of 34 tons 0cwt. 111lbs. cut in 1913.

In explanation of the returns summarised in Table IV. it should be stated that plot A.B. was sown on March 17th, plot L on March 30th, and plot M on April 10th. The aftermath following the final scything amounted to about 30cwt. per acre but this is not taken into account in the above tables. The influence of the time of seeding is well brought out by the fact that the latest sown plot yielded only three crops, whereas four cuts were taken off the other two.

TABLE V.—*Showing Yields of Greenstuff Obtained from Irrigated Berseem Clover at Roseworthy College,* 1912-1916.

| Year. | Area. Acres. | Total Yield. |  |  | Yield per Acre. |  |  |
|---|---|---|---|---|---|---|---|
|  |  | Tons. | cwts. | lbs. | Tons. | cwts. | lbs. |
| 1912 | 1·19 | 38 | 12 | 56 | 32 | 9 | 18 |
| 1913 | 3·201 | 108 | 19 | 97 | 34 | 0 | 111 |
| 1914 | 2·294 | 46 | 16 | 94 | 20 | 8 | 43 |
| 1915 | 3·411 | 98 | 16 | 66 | 28 | 19 | 53 |
| 1916 | 4·643 | 165 | 1 | 48 | 35 | 11 | 6 |
| Means | — |  | — |  | 30 | 5 | 91 |

In all 165 tons of green forage were carted off 4·6 acres between May 22nd and December 23rd, thus enabling us to give a regular and plentiful supply of fresh green fodder to the milking herd and also to supplement the normal ration of dry feed for the mares and foals with milk-producing greenstuff.

On reference to the above table it will be observed that the annual yields during the period 1912-1916 have been very uniform. It is true that in the drought year—1914—the acre yield dropped appreciably, but even so we weighed nearly 20½ tons off each acre sown, and over the whole five years period the mean return works out at 30 tons 5cwt. 91lbs. per acre. This amply justifies the opening statement that berseem ranks first amongst the winter growing soiling crops raised under irrigable conditions in this district.

## ENSILAGE CROPS.

As one of the larger pits was occupied by some sorghum silage cut at the end of the summer, the cereal silage harvest was a lighter task than usual. In all, 103 tons 11cwts. 28lbs. was led over the weighbridge from Fields Nos. 3 and 6A.

The former was under Calcutta oats, and in the case of the latter field, it was only the headlands that were cut for silage, and consequently the acre-yield is relatively low. Details of the treatment and cultivation of these fields will be given later on in connection with the hay and wheat harvests. The silage harvest took place between the 20th and 31st October.

TABLE VI.—*Showing Particulars of Cereal Ensilage Harvest in* 1916.

| Field. | Area. | Total Yield. | | | Acre Yield. | | |
|---|---|---|---|---|---|---|---|
| | Acres. | Tons. | cwts. | lbs. | Tons. | cwts. | lbs. |
| No. 3 | 8·694 | 83 | 4 | 2 | 9 | 11 | 45 |
| No. 6A (Headlands) | 3·740 | 20 | 7 | 26 | 5 | 8 | 70 |
| Totals | 12·443 | 103 | 11 | 28 | 8 | 6 | 51 |

TABLE VII.—*Showing Yields of Ensilage*, 1905-1916.

| Year. | Rainfall. | | Area. | Total Yield. | | | Yield per Acre. | | |
|---|---|---|---|---|---|---|---|---|---|
| | "Useful." | Total. | Acres. | T. | C. | L. | T. | C. | L. |
| 1905 | 14·23 | 16·71 | — | | — | | 8 | 10 | 0 |
| 1906 | 16·31 | 19·73 | 9·50 | 113 | 1 | 0 | 11 | 18 | 0 |
| 1907 | 13·96 | 15·13 | 17·15 | 92 | 2 | 75 | 5 | 7 | 34 |
| 1908 | 15·52 | 17·75 | 17·00 | 129 | 10 | 76 | 7 | 12 | 44 |
| 1909 | 21·15 | 24·05 | 16·962 | 169 | 18 | 90 | 10 | 0 | 3 |
| 1910 | 16·79 | 23·87 | 15·490 | 134 | 1 | 43 | 8 | 15 | 32 |
| 1911 | 9·45 | 13·68 | 30·740 | 152 | 16 | 28 | 4 | 19 | 47 |
| 1912 | 13·05 | 14·97 | 40·700 | 141 | 4 | 73 | 3 | 9 | 45 |
| 1913 | 10·82 | 15·66 | 61·511 | 115 | 14 | 24 | 1 | 17 | 70 |
| 1914 | 6·12 | 9·36 | — | | — | | | — | |
| 1915 | 18·33 | 19·76 | 27·384 | 153 | 14 | 107 | 5 | 12 | 33 |
| 1916 | 20·25 | 23·23 | 12·443 | 103 | 11 | 28 | 8 | 6 | 51 |
| 1905-16 (Average for 11 years) | | | | | | | 6 | 18 | 104 |

The yield of over 9½ tons per acre from Field No. 3 is highly satisfactory, being above the average returns for all previous seasons except 1906 and 1909. It also compares very favorably with the mean return of 6 tons 18cwts. 104lbs. for the period 1905-1916. The headland in 6A was sown with King's White a month later than No. 3, and the soil being a heavy clay, the wheat did not get a proper start before the June downpour arrived, hence it failed to yield as high as might have been expected in such a favorable year.

The effect of the past season has been to raise the mean acre yield by 2¾cwts.

## RELATION BETWEEN ENSILED CEREAL CROPS AND QUANTITY OF TWINE USED.

Following the plan adopted last season, the twine requirements of the cereal crops bound up for silage have been recorded and are shown below :—

Table VIII.—*Showing Quantity of Crop Cut for Silage per Ball of Twine used.*

| Year. | Area. | Total Yield. | | | Acre Yield. | | | Weight of Crop Cut. | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Acres. | T. | C. | L. | T. | C. | L. | T. | C. | L. |
| 1915 | 27·384 | 153 | 14 | 107 | 5 | 12 | 33 | 4 | 7 | 55 |
| 1916 | 12·443 | 103 | 11 | 28 | 8 | 6 | 51 | 4 | 16 | 38 |
| Average | | | | | 6 | 19 | 42 | 4 | 11 | 102 |

## THE HAY HARVEST.

As we had a balance of approximately 600 tons of hay on hand it was decided to restrict haymaking this season to three home paddocks, comprising an area of about 80 acres. It was estimated that this would return us between 225 and 250 tons, after allowing for losses sustained in binding crops that had been knocked down and tangled by rough weather. Our estimate, however, proved to be far too low, as the hay area yielded nearly 280 tons, and in addition the headlands cut almost 7½cwts. better than the mean hay yield for the farm for the period 1904-1915. Ultimately we weighed into the stack 374 tons 17cwts. 8lbs. of hay, one-third of which was oaten and the balance wheaten. The quality of the hay was better than in 1915, being almost free from rust and well furnished with grain. It was, of course, ranker than hay grown in years of normal rainfall ; but, fortunately, we were able to complete hay-carting before the new year, and hence the loss in nutritive qualities and palatability occasioned by long exposure in the stook were avoided.

The fields in which the 1916 hay crop were grown were Nos. 7A, 7B, and No. 3.

Table IX.—*Showing Particulars of* 1916 *Hay Harvest.*

| Field. | Area | Total Yield | | | Acre Yield | | |
|---|---|---|---|---|---|---|---|
| | Acres. | Tons | cwts. | lbs. | Tons | cwts. | lbs. |
| 7A | 21·064 | 77 | 12 | 73 | 3 | 13 | 80 |
| 7B | 22·443 | 75 | 19 | 82 | 3 | 7 | 80 |
| 3 | 39·236 | 126 | 5 | 5 | 3 | 4 | 40 |
| **Totals** | 82·743 | 279 | 17 | 48 | 3 | 7 | 73 |
| **Headlands** | 38·984 | 94 | 19 | 72 | 2 | 8 | 82 |
| **Grand Totals** | 121·727 | 374 | 17 | 8 | 3 | 1 | 66 |

### Field No. 7a.

*Previous History.*

1897. Pasture.
1898. Wheat.
1899. Pasture.
1900. Oats.
1901. Pasture.
1902. Oats.
1903. Sorghum.
1904. Bare fallow.
1905. Wheat and oats.
1906. Kale.
1907. Maize and sorghum.
1908. Barley.
1909-11. Sown grasses.
1912. Maize, sorghum, and bare fallow.
1913. Barley, oats, and lucerne.
1914. Pasture.
1915. Bare fallow.

This field contains 21 acres of relatively heavy clay loam with an old drainage depression running through it. Being the home paddock, it has been frequently set aside for forage crops or else reserved for pasturage, and every year it has been heavily stocked at some period. From the summarised history given above it will be seen that it has only been under cereals seven times in the last 20 years, and only twice before during that period has it borne a wheat crop. The soil, therefore, was in a high state of fertility and even in a normal season there was good reason to anticipate excellent results.

The land was broken up by October 18th and left in the rough till just before seeding. It was then rolled with the heavy clod-crusher and disc-cultivated during May, and drilled with King's Red (Selection 7) wheat at the rate of 100lbs. per acre, together with 2cwts. of superphosphate. The harrows preceded and followed the drill, the teams finally leaving the field on June 9th.

The crop stooled out splendidly and grew very fast in September during the dry spell. It then began to lean over, and by the time it was ready for cutting it had lodged to such an extent that the binders could only work in two directions. This made the work very tedious, but the yield was magnificent, and will probably constitute a record here for many a year. The binders started the last day in October, and the last load was hauled out on the 4th of December.

### Field No. 7b.

*Prior History.*

1897. Pasture.
1898. Wheat.
1899. Pasture.
1900. Oats.
1901. Pasture.
1902. Oats.
1903. Pasture.
1904. Bare fallow.
1905. Wheat and oats.
1906. Crimson clover.
1907. Pasture.
1908. Maize and sorghum.
1909. Barley.
1910. Maize and sorghum.
1911. Wheat and oats.
1912. Pease.
1913. Wheat and oats.
1914. Pasture.
1915. Bare fallow.

There are 22 acres of good wheat land in this field, which is lighter in character, and contains more limestone than the previous paddock. It is situated on rising ground, and when in grass furnishes sweet, nutritious pasture. Though more distant from the Farm it is also treated as a home field, and has, therefore, been used more largely for grazing than cropping. It has carried wheat only four times, and has been bare-fallowed but twice in the last 20 years. The intention was to top-dress this and the preceding field with lucerne, and to let them lie out again as pasture paddocks for two or three years, but owing to the sudden downpour in June this idea had to be abandoned.

The land received precisely the same treatment throughout as the companion field No. 7A, being sown with the same kind of seed and manure. The difference of 6cwts. in the yield is to be attributed to the lighter quality of the land.

## FIELD NO. 3.

### *Past History.*

1897. Pasture.
1898. Wheat.
1899. Pasture.
1900. Oats.
1901. Pasture.
1902. Oats.
1903. Pasture.
1904. Fallow.
1905. Wheat, oats, and barley.
1906. Rape
1907. Pasture.
1908. Pasture.
1909. Sorghum.
1910. Wheat and oats.
1911/1914. Lucerne.
1915. Bare fallow.

With a view to reducing hay hauling to a minimum, the fields nearest to the steading were sown for hay, and consequently it was arranged that this field, which adjoins the other two already described should be sown with Calcutta oats as a hay crop. There are in all 47·93 acres in this field, and the soil is very variable in character. Chiefly it consists of a greyish limestone bank carrying plenty of stone, but it slopes down on the western side to a heavy black "crab-hole" flat. It has not been heavily cropped for many years, but it has been very heavily stocked, as it carries abundance of natural feed on the bank in normal years, and always furnishes late grazing on the low-lying portion. Turning to the tabulated history it will be noticed that this is the fourth wheat crop grown on it since 1897. In 1905 it yielded 3 tons 9cwts. 74lbs. of hay, and in 1910 3 tons 9cwts. 72lbs. of hay per acre. From 1910 to 1914 it was under lucerne, and last year it was fallowed during July and August, broken down with the disc cultivator in November, cultivated a second time in April, and drilled on a harrowed seedbed with 100lbs Calcutta oats and 2cwts. superphosphate per acre by the 3rd of May. A stroke of the harrows completed seeding operations.

An area of 8·694 acres was cut early for silage, and the remainder, 39·236 acres, was cut for hay in the last fortnight of November. This was a most troublesome crop to bind, and the stubble was exceptionally long and ragged. Nevertheless we harvested 3 tons 4cwts. 40lbs. per acre of excellent oaten hay, which was carted and stacked by the 28th of December.

### HEADLANDS.

The total area cut round the other fields to facilitate harvesting was 38·984 acres, and it averaged 2 tons 8cwts. 82lbs. per acre. Included in this area are headlands from two barley fields which yielded less than a ton, and also scrub headlands which, as the result of the proximity of trees, cut only 36cwts. per acre.

## THE AMOUNT OF HAY CUT PER BALL OF BINDER TWINE.

TABLE 10.—*Showing the Relation between a Ball of Binder Twine and the amount of Hay Cut for the Period* 1911/1916.

| Year. | Area. | Yield per Acre. | | | No. of | Hay Cut per Ball. | | |
|---|---|---|---|---|---|---|---|---|
| | Acres. | T. | C. | L. | Balls. | T. | C. | L. |
| 1911 | 200·100 | 1 | 8 | 6 | 120½ | 2 | 6 | 65 |
| 1912 | 237·223 | 1 | 14 | 91 | 200½ | 2 | 0 | 54 |
| 1913 | 228·909 | 0 | 16 | 6 | 108 | 1 | 14 | 3 |
| 1914 | 232·406 | 0 | 14 | 78 | 85 | 2 | 0 | 17 |
| 1915 | 341·649 | 2 | 7 | 23 | 406 | 1 | 19 | 81 |
| 1916 | 121·727 | 3 | 1 | 66 | 166½ | 2 | 5 | 3 |
| Average for 1911-1916 | | 1 | 13 | 82 | — | 2 | 1 | 0 |

For the past season the amount of twine used per ton of hay has been lower than all the preceding years, with the single exception of 1911. The figures, however, must be understood as applying to a year when harvesting was beset with very great difficulty. In many instances the binders could only work advantageously in one or at most in two directions, and even then it was by no means an easy matter to prevent the knotters from missing sheaves. The result was that the proportion of untied sheaves was unusually high, and as no account of the loose stuff as distinct from the sheaved hay was kept, the ball of twine has received more credit than is strictly due to it. This is an accidental factor that disturbs our records occasionally, but it does not seriously affect the mean figures for a period of several seasons. We see then that on the average the amount of hay bound per ball of twine works out at 2 tons 1cwt.

## AVERAGE HAY YIELD, 1916.

If we confine our attention in the first instance to the fields intended to be used for hay crops, namely 7A, 7B, and 3, we will see that the wheaten hay crops averaged 3 tons 10cwts. 69lbs. and the oat crop 6cwts. 29lbs. less. By combining these averages with the yield from the headlands, the mean return is seen to drop to 3 tons 1cwt. 66lbs., which, however, is still a highly satisfactory average, and has only once been exceeded since 1904. This was in 1905, when the corresponding yield worked out at 3 tons 2cwts. 71lbs., or 1cwt. 5lbs. per acre above the 1916 average.

The mean acre yield for the last 13 years is 2 tons 2cwts. 68lbs., an increase of 1cwt. 65lbs. on the mean return for 1904/1915. If we place a valuation of 35s. per ton on hay and 3s. 6d. a bushel on wheat, we find that the gross return from hay-growing is £3 15s. per acre on the average, whilst the corresponding return from wheat is £3 2s. 6d. This leaves a credit balance of 12s. 6d. per acre per annum in favor of hay-growing, and when the whole period of 13 years is considered, this represents a total amount of £8 2s. 6d. per acre. This bears out the contention that this locality is better adapted for hay than wheat.

Table XI.—*Showing Average Hay Yields on the College Farm*, 1904/16

| Year. | Rainfall. |  | Area. | Total Yield. |  |  | Average Yield. |  |  |
|---|---|---|---|---|---|---|---|---|---|
|  | " Useful." Inches. | Total. Inches. | Acres. | T. | C. | L. | T. | C. | L. |
| 1904 ............... | 11·60 | 14·70 | 93·000 | 238 | 0 | 0 | 2 | 11 | 22 |
| 1905 ............... | 14·23 | 16·71 | 67·000 | 198 | 8 | 22 | 3 | 2 | 71 |
| 1906 ............... | 16·31 | 19·73 | 93·000 | 241 | 0 | 0 | 2 | 11 | 90 |
| 1907 ............... | 13·96 | 15·13 | 51·000 | 91 | 14 | 20 | 1 | 15 | 108 |
| 1908 ............... | 15·52 | 17·75 | 112·800 | 293 | 6 | 23 | 2 | 7 | 5 |
| 1909 ............... | 21·15 | 24·05 | 145·397 | 404 | 4 | 54 | 2 | 15 | 68 |
| 1910 ............... | 16·79 | 23·87 | 94·900 | 224 | 7 | 6 | 2 | 7 | 31 |
| 1911 ............... | 9·45 | 13·68 | 200·100 | 290 | 12 | 94 | 1 | 8 | 6 |
| 1912 ............... | 13·05 | 14·97 | 248·450 | 432 | 7 | 49 | 1 | 14 | 90 |
| 1913 ............... | 10·82 | 15·66 | 258·200 | 207 | 7 | 111 | 0 | 16 | 7 |
| 1914 ............... | 6·12 | 9·36 | 247·647 | 181 | 13 | 107 | 0 | 14 | 75 |
| 1915 ............... | 18·33 | 19·76 | 341·649 | 806 | 7 | 36 | 2 | 7 | 23 |
| 1916 ............... | 20·25 | 23·23 | 121·727 | 374 | 17 | 8 | 3 | 1 | 66 |
| Average for 13 years............... |  |  |  |  |  |  | 2 | 2 | 68 |

## PEA HARVEST.

Field peas cannot be grown satisfactorily as a grain-producing crop on this farm every year, but in late seasons such as we have just experienced they flourish and pod well. As a rule they are grown solely as a grazing crop, and it was with this object in view that they were sown last autumn. However, they developed so well that in view of the abundance of good paddock feed available elsewhere I decided to hold one field back for grain, and the results obtained justified the action. The field selected, No. 1, comprises 11·46 acres of light soil with a good deal of limestone on the surface. The past history is as follows:—

| | |
|---|---|
| 1898 Wheat. | 1907. Wheat. |
| 1899. Pasture. | 1908/13. Pasture, |
| 1900. Oats. | 1914. Sorghum (failure). |
| 1901/06. Pasture. | 1915. Wheat (twice harvested). |

Considering that the field has only carried one crop since 1907, it is obvious that the soil was well fitted to support another, and the condition of the land, coupled with the mildness of the season, gave the peas every advantage. The 1915 stubble was disc ploughed the first week in June, and immediately harrowed down and sown with 2bush. of Early Dun peas and 2cwts. of 36/38 grade superphosphate per acre. Beyond a harrowing on the drilled surface no after-treatment was given. Germination was brisk and even, and the plants made good headway during July and August, and the crop was nearly in full flower when the October frost occurred. Yet it came through without a check. It did not make as much haulm as might have been expected, but the pods were plentiful and well filled. Early in December advantage was taken of a showery spell to mow the crop with the ordinary grass mower fitted with the Tolton pea harvester attachment. and within a week the old Ransomes thresher was fitted with a smooth concave and moved out to the field. We threshed in all 352bush. 8lbs. of peas, or 30bush. 44lbs. per acre. The sample was clean and sound, although not so plump as peas grown under humid conditions.

## BARLEY HARVEST.

The barley crops of 1916 did not prosper so well as most of the other cereals, but it is as well to admit at the outset that the chief reason for this was the delay in harvesting due to a commendable ambition to complete hay-stacking before the new year. It is regrettable, however, that the saving of the hay in good condition should have led to such heavy losses in the barley fields, and these circumstances should be kept prominently in mind lest the falling off in the returns should be interpreted as indicating inability on the part of barley to thrive under the soil and weather conditions experienced last season. That this is not the case is evidenced by the fact that some varieties which were taken off at the right time returned over 50bush. to the acre. What actually happened was that during December the ripe barley crops were knocked about severely by a succession of hot, north-west winds. The high temperatures then prevailing caused the straw to become very brittle, and under the influence of the violent winds the heads snapped off, and the grain was shed to such an extent that I doubt if as much as half the grain grown was recovered. From a farming point of view I do not regret this very much, as a very large amount will return to us in the shape of sheep feed, and I still consider it pays better to secure hay in December and suffer the loss in barley instead of garnering the whole of the grain, which would have meant the carting of impoverished weather-worn stuff out of the hay fields in February. It is only in so far as the loss in the barley harvest affects the continuous records of the College crops that the circumstances are regrettable, and it is for this reason principally that I have been at some pains to explain the circumstances.

TABLE XI.—*Showing Details of the Barley Harvest*, 1916.

| Field. | Area. Acres. | Total Yield. Bush. | Total Yield. Lbs. | Acre Yield. Bush. | Acre Yield. Lbs. |
|---|---|---|---|---|---|
| Nottle's A | 24·491 | 500 | 48 | 20 | 23 |
| Daly's B and C | 97·778 | 1,025 | 2 | 10 | 24 |
| Experimental Field | 5·929 | 49 | 47 | 8 | 21 |
| Totals | 128·198 | 1,575 | 47 | 12 | 15 |

### NOTTLE'S A.

#### *Prior History.*

1897. Bare fallow.
1898. Wheat.
1899. Wheat.
1900. Bare fallow.
1901. Wheat.
1902. Pasture.
1903. Bare fallow.
1904. Wheat.
1905. Bare fallow.
1906. Wheat and barley.
1907. Pasture.
1908. Bare fallow.
1909. Wheat and oats.
1910--12. Pasture.
1913. Bare fallow.
1914. Wheat (failure).
1915. Wheat.

The soil in this field is a free working loam and well suited to the needs of a barley crop. The stubble was lifted early in June, and immediately cultivated to a tilth and sown about the middle of the month with 2cwt. of superphosphate and a number of varieties of four and six-rowed barleys. The highest yield was 56bush. 41lbs. obtained from a late type of four-rowed barley known as Tunis 2 A. Two early six-rowed barleys, Tunis 7 C and Tunis 7 bis., returned 51bush. 12lbs., and 50bush. 44lbs. respectively, whilst an early mid-season type of the same species—Tunis 8 C—gave 36bush. 44lbs. In the case of some of the other varieties, particularly the early ones, sparrows stripped a large percentage of the heads, and, as is to be expected in experimental trials of this kind, some of the barleys proved unsuitable. The more promising varieties will be carried on for a year or two longer until we are able to determine their values in relation to those already in regular use.

### DALY'S B. AND C.

There are approximately 100 acres in this block, and although the land is of good average quality it is subject to flooding in wet years, a factor that seriously handicapped the barley crop last season.

#### *Past History.*

1912. Bare fallow.
1913. Wheat.
1914. Bare fallow.
1915. Wheat and barley.

This field was treated in precisely the same manner as Nottle's A, but was sown with short-head barley (Selection 8) at the rate of 70lbs. per acre. The June floods drowned out portions of the crop and gave the whole field a set back from which it did not recover till the spring. The crop was short, but the heads were well-filled and the barley harvested was exceptionally plump.

## Average Barley Yield.

TABLE XII.—*Showing General Average Barley Yields on the College Farm: 1904-1916.*

| Season. | Rainfall. "Useful." | Rainfall. Total. | Area. | Average Yield per Acre. | |
|---|---|---|---|---|---|
| | Inches. | Inches. | Acres. | Bush. | Lbs. |
| 1904 | 11·60 | 14·70 | 27·86 | 38 | 33 |
| 1905 | 14·23 | 16·71 | 65·73 | 25 | 4 |
| 1906 | 16·31 | 19·73 | 51·00 | 40 | 38 |
| 1907 | 13·96 | 15·13 | 79·30 | 31 | 21 |
| 1908 | 15·52 | 17·75 | 94·83 | 43 | 49 |
| 1909 | 21·15 | 24·05 | 75·27 | 35 | 0 |
| 1910 | 16·79 | 23·87 | 113·42 | 37 | 9 |
| 1911 | 9·45 | 13·68 | 76·09 | 39 | 31 |
| 1912 | 13·05 | 14·97 | 123·82 | 22 | 21 |
| 1913 | 10·82 | 15·66 | 91·09 | 12 | 19 |
| 1914 | 6·12 | 9·36 | 12·85 | 2 | 26 |
| 1915 | 18·33 | 19·76 | 24·44 | 41 | 40 |
| 1916 | 20·25 | 23·23 | 128·198 | 12 | 15 |
| Mean for 13 years | | | | 29 | 24 |

The above figures show that the 1916 yield was lower than has been recorded in any previous year except the drought season, 1914. The effect has been to reduce the mean barley yield from 30bush. 45lbs. to 29bush. 24lbs. However, even on this figure of nearly 30bush. the cultivation of barley on stubble ground offers many inducements to farmers who are anxious to get the most out of their land.

## THE OAT HARVEST.

The area under oats this year was nearly all cut out for silage and hay; only 6·356 acres were harvested for grain. A small paddock of 3·528 acres known as Grainger's Sheep Field, was ploughed up towards the end of April and drilled in with 80lbs. of Scotch Grey oats (Selection 3), a variety that appears likely to find a permanent place in our cropping scheme. The crop went down so badly in patches that it was decided to cut and thresh it. Eventually we obtained an average yield of 35bush. 37lbs. per acre.

In another field, No. 6 B, an area of 2·828 acres under oats was divided into three plots: these carried crops of Sunrise, Scotch Grey, and Algerian Tartar oats. The former is a white-grained variety, but in most other respects resembles Algerian oats. Algerian Tartars are also white grained, but they ripen later and are shorter in the straw. They did not yield heavily, but owing to the condition of the crop considerable waste occurred in the harvesting. Both of these varieties are well deserving of further trial.

### AVERAGE OAT YIELD.

TABLE XIII.—*Showing Average Yields of Oats on the College Farm*, 1905-16.

| Season. | Rainfall. "Useful." Inches. | Rainfall. Total. Inches. | Area. Acres. | Yield per Acre. Bush. | Yield per Acre. lbs. |
|---|---|---|---|---|---|
| 1905 | 14·23 | 16·71 | 20·00 | 43 | 10 |
| 1906 | 16·31 | 19·73 | 33·50 | 41 | 18 |
| 1907 | 13·96 | 15·13 | 20·00 | * | — |
| 1908 | 15·52 | 17·75 | 20·00 | 22 | 28 |
| 1909 | 21·15 | 24·05 | 23·52 | 43 | 19 |
| 1910 | 16·79 | 23·87 | 24·60 | 28 | 15 |
| 1911 | 9·45 | 13·68 | 22·82 | 22 | 8 |
| 1912 | 13·05 | 14·97 | 52·00 | 10 | 4 |
| 1913 | 10·82 | 15·66 | 3·33 | 11 | 36 |
| 1914 | 6·12 | 9·36 | — | | — |
| 1915 | 18·33 | 19·76 | 1·10 | 32 | 32 |
| 1916 | 20·25 | 23·23 | 6·36 | 27 | 15 |
| Average for 10 years (omitting 1907 and 1914) | | | | 28 | 14 |

*Complete failure from feeding off with sheep.

## THE RYE HARVEST.

As in former years, a small area was devoted to rye crops mainly for the sake of the straw. They were located in Field No. 6 B on land that is heavier than this crop usually affects. The seed was sown at the rate of 60lbs. on a fallowed seed-bed, and the customary dressing of 2cwts. superphosphate was applied at the same time.

Appended are the details of the seasonal averages, and also the mean yields for the period 1909-1916:—

TABLE XIV.—*Showing Details of Rye Crops*, 1916.

| Variety. | Area. Acres. | Yield per acre. Bush. | Yield per acre. lbs. |
|---|---|---|---|
| March | 0·637 | 6 | 30 |
| Multicaule | 1·523 | 9 | 18 |
| Schlanstedt | 0·637 | 7 | 19 |
| Giant Winter | 0·637 | 6 | 31 |
| **Average yield of rye, 1916** | | 7 | 52 |

TABLE XV.—*Showing Yields Per Acre of Rye on College Farm*, 1909-1916.

| Season. | March. Rye. Bush. | March. Rye. lbs. | Multicaule Rye. Bush. | Multicaule Rye. lbs. | Giant Winter Rye. Bush. | Giant Winter Rye. lbs. | Schlanstedt Rye. Bush. | Schlanstedt Rye. lbs. | Means. Bush. | Means. lbs. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1909 | 7 | 46 | 8 | 44 | 11 | 34 | 4 | 3 | 8 | 15 |
| 1910 | 16 | 4 | 12 | 40 | 12 | 36 | 15 | 14 | 14 | 9 |
| 1911 | 20 | 9 | 11 | 24 | 9 | 45 | 9 | 48 | 12 | 43 |
| 1912 | 15 | 6 | 11 | 22 | 11 | 4 | 10 | 13 | 12 | 0 |
| 1913 | 11 | 49 | 11 | 42 | 12 | 0 | 7 | 0 | 10 | 36 |
| 1914 | 3 | 20 | 3 | 11 | 0 | 47 | 0 | 51 | 2 | 0 |
| 1915 | 22 | 41 | 23 | 47 | 23 | 24 | 27 | 31 | 23 | 35 |
| 1916 | 6 | 30 | 9 | 18 | 6 | 31 | 7 | 19 | 7 | 52 |
| Means eight years | 12 | 54 | 11 | 31 | 11 | 0 | 10 | 15 | 11 | 24 |

## THE WHEAT CROP.

The outstanding features of the 1916 wheat season were the bulk of straw and flag, the high grain yield, and the large size and plumpness of the grain. It was noticeable that some of the very late varieties, which produce 50bush. to 60bush. crops under humid conditions were encouraged by the late rains to develop more ears and more grains to the spikelet than they were able to mature, and in consequence some of the finest looking heads contained grain of inferior quality. All the early and mid-season varieties, however, matured an excellent sample, as is evidenced by the low percentage of tailings from the graders as well as by the extremely high yields obtained.

Up till 1916 the heaviest wheat crop harvested on the College farm was a block of Beardless Odessa, which returned 42bush. 40lbs. in 1912. This season we threshed three plots of King's White (Selection 6) in Field No. 4, and secured from them 49bush. 28lbs., 47bush. 20lbs., and 46bush. 5lbs. per acre respectively. The first plot received quarter of a ton of lime on the fallow and 2cwts. of superphosphate at seeding ; the second 14 tons of farmyard manure, 2cwts. of superphosphate, and ½cwt. of sulphate of potash at seeding ; and the third was dressed with 3cwts. superphosphate and 1cwt. of nitrate of soda. However, I do not wish to create the impression that these exceptionally high returns which have been obtained from small areas are anything more than a guide to the possibilities of the land when brought under climatic conditions that approximate to those that obtain where 50bush. and 60bush. crops are the reward of good farming.

The garnering of the harvest has not been carried out as cleanly as usual, for although the employment of modern machines and appliances has reduced the wastage and enabled us to cope with the " down " crops, yet the losses have been heavier than usual. There is no doubt that if we were to experience a succession of such seasons it would be a sound economic policy to resort to binders and threshers. Those who have had occasion to burn off stubbles will have been struck with the leakage, even on fields that have returned from 30bush. to 35bush., in the bags. Naturally in a year like this, when the crops are returning from 50 to 100 per cent. above the mean yield, and with the prospect of a good market, the wastage does not attract serious attention. Nevertheless, it certainly has occurred, and I am convinced that had the crops in this locality been cut and threshed they would have filled at least another bag, and possibly two bags, to the acre. Not only was the stripping less thorough, owing to the state in which the crops were at harvest time, but in addition the loss incurred was increased by the shattering of the over-ripe heads as they reached the comb. This leakage is always to be expected in years when the wheat yield is phenomenally high, since our methods are very properly adapted to suit average conditions. On the

College crops we employed all the known methods of harvesting in order that students might have the opportunity of becoming personally familiar with them.

The season was not favorable to fungoid attacks, indeed the crops were singularly free from smut, bunt, flag smut, and rust. Owing to late fallowing the plots in one field showed signs of an attack by "take-all" (*Ophiobolius Graminis*), but otherwise we suffered no losses through disease. All seed sown was pickled in a 1½ per cent. bluestone solution.

The total area of land under wheat for grain on the College farm last year was 211·512 acres, and of this 70·65 acres had carried forage crops the year before. The bare-fallow wheat rotation has again demonstrated its superiority, the average return per acre from farm land so treated being 24bush. 32lbs., as compared with 20bush. 14lbs. from land that carried rape and kale crops in 1915.

It will be understood in connection with the field notes following the appended table that in all cases the wheat is sown at the rate of 100lbs. of graded seed and the superphosphate at the rate of 2cwts. of 36/38 quality to the acre, unless otherwise stated.

### TABLE XVI.—*Summary of Wheat Returns*, 1916.

| | Area. | Total Yield. | | Acre Yield. | |
|---|---|---|---|---|---|
| | Acres. | Bush. | lbs. | Bush. | lbs. |
| Farm crops | 211·512 | 4,887 | 2 | 23 | 6 |
| Experimental crops (1 acre and over) | 119·425 | 3,297 | 20 | 27 | 37 |
| Totals | 330·937 | 8,184 | 22 | 24 | 44 |
| Experimental plots (under 1 acre) | 18·857 | 473 | 58 | 25 | 8 |
| Grand totals | 349·794 | 8,658 | 20 | 24 | 45 |

### FIELD NO. 5 B.

This field is 83 acres in area. Its past history is indicated below:—

1897. Bare fallow.
1898. Wheat.
1899. Wheat.
1900. Bare fallow.
1901. Wheat and oats.
1902. Pasture.
1903. Bare fallow.
1904. Wheat.
1905. Pasture.
1906. Bare fallow.
1907. Wheat.
1908. Bare fallow.
1909. Wheat.
1910-11. Pasture.
1912. Bare fallow.
1913. Wheat.
1914. Pasture.
1915. Bare fallow.

The soil enclosed in this field is an adhesive clay for the most part, with a number of claypans scattered through it. It was fallow-ploughed between August 20th and September 23rd, and in the following autumn was worked down after the first rains and prepared for a hay crop. King's White (Selection 6) was therefore sown at the rate of 2bush., which is our normal seeding for wheaten hay.

The abundant yield from the other hayfields, however, enabled us to harvest this crop for grain, and as it was lying well over in some parts the reaper-thresher was employed for the purpose. From the 78·393 acres we took off 1,994bush. 40lbs., which is equivalent to a yield of 25bush. 27lbs. per acre.

### EBSARY'S C.

This field consists of a medium class of mallee land rising to a sandy ridge at the south-eastern boundary. Its past history is as under:—

1899. Bare fallow.
1900. Wheat.
1901. Bare fallow.
1902. Wheat.
1903. Bare fallow.
1904. Barley.
1905. Pasture.
1906. Bare fallow.
1907. Wheat.
1908. Rape.
1909. Bare fallow.
1910. Wheat.
1911. Barley.
1912. Pasture.
1913. Bare fallow.
1914. Wheat.
1915. Bare fallow.

This field has always given good results when sown with Gluyas, and we therefore choose this variety for 1916 seeding. The fallow was started on July 23rd and finished on August 4th. In October and January it was cultivated and the preparatory work carried out in May consisted of another stirring with the ordinary fixed-tine cultivator. Between the 7th and 10th of June it was sown with selections 7, 8, 9, and 10 of Gluyas wheat and the drilling was then harrowed.

The wheat grew apace and began to show a decided lean very early in the season. It never recovered from this, but, on the contrary, went down nearer to the ground with every storm. In addition, it had to be left till late in January before the reaper-thresher could be spared to take it off. Nevertheless the results were eminently staisfactory, the field averaging 30bush. 25lbs. of bright plump grain. It would be safe to estimate the loss in harvesting this field at 5bush. to 6bush. per acre. Details of the harvest are here shown:—

TABLE XVII.—*Showing Particulars of Wheat Harvest in Ebsary's C., 1916.*

| Variety. | Selection. | Area. | Total Yield. | | Acre Yield | |
|---|---|---|---|---|---|---|
| | | Acres. | Bush. | lbs. | Bush. | lbs. |
| Gluyas | 10 | 1·819 | 43 | 26 | 23 | 53 |
| Gluyas | 9 | 15·345 | 508 | 2 | 33 | 6 |
| Gluyas | 8 | 14·051 | 426 | 46 | 30 | 22 |
| Gluyas | 7 | 4·156 | 97 | 37 | 23 | 29 |
| Totals | | 35·371 | 1,075 | 51 | 30 | 25 |

### DAHLITZ.

This field was sown this year with a series of pedigreed wheats, all of which have been bred or raised by selection at the College. The past history of this field is summarised below :—

1899. Purchased and fallowed.
1900. Wheat.
1901. Bare fallow.
1902. Wheat and oats.
1903. Barley.
1904. Pease.
1905. Oats.
1906. Wheat.
1907. Rape.
1908. Bare fallow.
1909. Wheat.
1910. Pasture.
1911. Bare fallow.
1912. Wheat and barley.
1913. Pease and barley.
1914. Sorghum (failure).
1915. Bare fallow.

This field was worked in November, 1914, and sown with sorghum, but very few seeds germinated, and the land was, therefore, virtually a summer fallow. In August of the next year it was fallowed and turned up rather rough. It was rolled with a heavy roller at the end of October and disc-cultivated in November. The preparatory working for this year's crop began with a discing in April ; the disc cultivator was followed by the scarifier, fluted roller, scarifier and harrows. Drilling took place between May 17th and 24th, the seed being sown at 100lbs. per acre. The varieties of wheat used are as follows :—Anvil, Eureka, Sevens, Daphne, Cad, Marshall's No. 3B, College Eclipse, Basil, and Caliph.

In the preparation of this field for seeding, I am inclined to think that the land was worked too often before the rains had soaked well down. Evidence of white heads was to be found running across the plots, and yet fields which were later ploughed and not subject to the same amount of consolidating tillage, were quite free from it. The soil is of a light loamy character, and the overworking in April produced too fine and powdery a seedbed, and the yields suffered in consequence. In addition, several of the wheats tried are new types, and their ability to yield under field conditions has not hitherto been tested. Two of the plots were taken off with the reaper-thresher—College Eclipse and Daphne—whilst the remainder was harvested with the ordinary stripper. The yields were as follows :—

TABLE XVIII.—*Showing Details of Wheat Yields from Dahlitz*, 1916.

| Variety. | Selection. | Area. Acres. | Total Yield. Bush. | Total Yield. lbs. | Acre Yield. Bush. | Acre Yield. lbs. |
|---|---|---|---|---|---|---|
| Cad | 3 | 2·431 | 41 | 48 | 17 | 12 |
| College Eclipse | 7 | 4·396 | 68 | 24 | 15 | 34 |
| Basil | 1 | 9·147 | 139 | 53 | 15 | 18 |
| Caliph | 1 | 2·144 | 32 | 13 | 15 | 2 |
| Sevens | — | 2·166 | 27 | 55 | 12 | 53 |
| Marshall's 3B | 3 | 2·890 | 35 | 5 | 12 | 8 |
| Daphne | 3 | 2·063 | 24 | 15 | 11 | 45 |
| Anvil | 3 | 0·775 | 7 | 46 | 10 | 1 |
| Eureka | 2 | 1·084 | 9 | 8 | 8 | 26 |
| Total for Field |  | 27·096 | 386 | 27 | 14 | 16 |

## NOTTLE'S C.

### *Previous History.*

1897. Bare fallow.
1898. Wheat.
1899. Wheat.
1900. Bare fallow.
1901. Wheat.
1902. Pasture.
1903. Bare fallow.
1904. Wheat.
1905. Bare fallow.
1906. Wheat & barley.
1907. Pasture.
1908. Bare fallow
1909. Wheat, oats, and lucerne.
1910. Pasture.
1911. Pasture.
1912. Pasture.
1913. Bare fallow.
1914. Wheat, oats, and barley (failure).
1915. Rape.

As this field had not been heavily cropped since 1909 it was decided to make good the shortage of fallow in 1915 by bringing under wheat this field and Daly's A, which had borne grazing crops the year before.

The rape and mustard stubble was ploughed with the disc implement, rolled with the Cambridge roller, cultivated and drilled between the 10th and 24th of May. Two varieties of wheat were sown, namely, Queen Fan and King's Red. The latter tended to "lodge" but the Queen Fan block withstood the weather well, and had it been possible to harvest it a fortnight earlier the yield would have been considerably increased. For crops not preceded by fallow the results, even as they stand, are very pleasing, and the paddock average of 26bush. 7lbs. leaves no grounds for complaint.

TABLE XIX.—*Showing Results Obtained in Nottle's C*, 1916.

| Variety. | Selection. | Area. | Total Yield. | | Average Yield. | |
|---|---|---|---|---|---|---|
| | | Acres. | Bush. | lbs. | Bush. | lbs. |
| King's Red | 10 | 3·248 | 98 | 58 | 30 | 28 |
| King's Red | 9 | 9·092 | 272 | 7 | 29 | 56 |
| King's Red | 8 | 4·332 | 109 | 3 | 25 | 10 |
| Queen Fan | 6 | 3·163 | 71 | 39 | 22 | 39 |
| Queen Fan | 4 | 6·303 | 131 | 3 | 20 | 48 |
| Totals for whole field | | 26·138 | 682 | 50 | 26 | 7 |

## DALY'S A.

This forms portion of 150 acres of land purchased in 1912. It comprises 50 acres of good wheat land, but in wet years the southern boundary becomes practically water-logged.

### *Prior History.*

1912. Bare fallow.
1913. Wheat.
1914. Bare fallow.
1915. Kale.

Like Nottle's C, this was under a winter-growing forage crop in 1915. The forage crop in this instance was thousand-headed kale, and it was grazed right up to April 29th, the date on which the ploughs started. The cultivators were at work from May 11th to May 16th, and the roller followed shortly after. At the end of May it was drilled in with King's Red, Selection 7, but rain interrupted the work and seeding was not concluded till June 9th. Being late sown it suffered from the heavy winter rains and a thin crop resulted, especially in the low-lying portion where numerous depressions were occupied wholly by canary grass and marsh weeds. This crop was " laid " to a greater extent than most of the crops of this variety, and the percentage lost in harvesting was relatively high, in fact, the yield per acre would certainly have exceeded seven standard bags had it been all harvested. Eventually we gathered 747bush. 14lbs. from the 44·514 acres, which works out at 16bush. 47lbs. per acre.

## EXPERIMENTAL WHEAT CROPS.

Of those plots over an acre in extent the great bulk were sown with King's White. Selection 6 was grown in Field No. 4 and the reversion plots; selection 9 in Grainger's manure plots; and selection 10 in the depth of ploughing plots. Late Gluyas occupied the 27 acres under cultivation tests in Grainger's A. The particulars of the 1916 harvest of these plots are shown in the appended tables:—

Table XX.—*Showing Yields of Varieties Grown on Experimental Areas in Plots of One Acre and Over.*

| Field. | Variety. | Selection. | Area. | Total Yield. | | Acre Yield. | |
|---|---|---|---|---|---|---|---|
| | | | Acres. | Bush. | lbs. | Bush. | lbs. |
| No. 4 .................. | King's White ... | 6 | 58·150 | 1,634 | 15 | 28 | 6 |
| Grainger's D—Reversion Plots | King's White ... | 6 | 6·400 | 222 | 24 | 34 | 45 |
| Grainger's C—Manure Plots | King's White ... | 9 | 14·100 | 379 | 33 | 26 | 55 |
| Grainger's B—Depth of Ploughing Plots | King's White ... | 10 | 2·802 | 64 | 38 | 23 | 4 |
| Grainger's A—Cultivation Plots | Late Gluyas .... | 6 | 24·559 | 700 | 39 | 28 | 32 |
| 6A .................... | Yandilla King ... | 4 | 1·824 | 63 | 28 | 34 | 48 |
| | Anvil .......... | 4 | 1·144 | 26 | 37 | 23 | 16 |
| | Basil ........... | 3 | 1·045 | 23 | 35 | 22 | 34 |
| | Queen Fan ..... | 7 | 1·161 | 26 | 10 | 22 | 32 |
| | Canaan ......... | 4 | 1·127 | 23 | 23 | 20 | 45 |
| | Caliph .......... | 1 | 3·316 | 65 | 9 | 19 | 39 |
| | Daphne ........ | 4 | 1·575 | 29 | 29 | 18 | 43 |
| | Eureka ......... | 3 | 1·078 | 19 | 12 | 17 | 49 |
| | College Comeback | 9 | 1·144 | 18 | 48 | 16 | 26 |
| Totals.......................... | | | 119·425 | 3,297 | 20 | 27 | 37 |

## Different Varieties of Wheat.—Compared on the Basis of Yielding Capacity.

Table XXI.—*Showing Yields of Chief Varieties of Wheat Grown in* 1916.

| Variety. | Area. | Highest Acre Yield. | | Lowest Acre Yield. | | Average Acre Yield. | | Mean Acre Yield. 1915 and 1916 | |
|---|---|---|---|---|---|---|---|---|---|
| | Acres. | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. |
| Gluyas .................. | 35·371 | 33 | 6 | 23 | 29 | 30 | 25 | 31 | 48 |
| Late Gluyas ............. | 24·559 | 28 | 37 | 28 | 5 | 28 | 32 | 26 | 11 |
| King's White ............ | 159·845 | 34 | 45 | 23 | 4 | 26 | 52 | 24 | 20 |
| Queen Fan .............. | 10·627 | 22 | 39 | 20 | 48 | 21 | 32 | 22 | 21 |
| King's Red .............. | 61·186 | 30 | 28 | 16 | 47 | 20 | 4 | 19 | 14 |
| Caliph ................. | 5·460 | 19 | 39 | 15 | 2 | 17 | 50 | 21 | 4 |
| Basil .................. | 10·192 | 22 | 34 | 15 | 18 | 16 | 2 | 22 | 16 |
| College Eclipse .......... | 4·396 | 15 | 34 | 15 | 34 | 15 | 34 | 17 | 52 |

TABLE XXII.—*Showing* 1916 *Yields of Latest Strains of College Hand-selected, Pedigree Wheats, Comparatively with those Obtained from Earlier Strains in Previous Seasons.*

YIELDS PER ACRE.

| Variety. | Selection. | 1916. Bush. | 1916. lbs. | 1915. Bush. | 1915. lbs. | 1914. Bush. | 1914. lbs. | 1913. Bush. | 1913. lbs. | 1912. Bush. | 1912. lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Queen Fan | 7 | 22 | 32 | 11 | 40 | — | | 9 | 55 | 23 | 6 |
| Federation | 8 | 29 | 30 | 8 | 13 | — | | 6 | 22 | 22 | 13 |
| Jonathan | 8 | 35 | 49 | 6 | 21 | — | | 6 | 16 | 24 | 55 |
| King's White | 11 | 14 | 30 | 16 | 43 | 15 | 46 | 8 | 30 | 26 | 53 |
| Marshall's No. 3B | 9 | 28 | 15 | 9 | 46 | — | | 9 | 39 | 21 | 36 |
| King's Red | 11 | 19 | 4 | 10 | 42 | 10 | 21 | 8 | 39 | 27 | 34 |
| Beardless Gluyas | 11 | 16 | 32 | 10 | 38 | 11 | 15 | 8 | 31 | 28 | 6 |
| Caliph | 1 | 19 | 39 | 20 | 50 | 10 | 12 | 6 | 53 | 28 | 20 |
| Gluyas | 11 | 13 | 37 | 18 | 29 | 13 | 5 | 10 | 56 | 21 | 32 |
| Late Gluyas | 11 | 13 | 4 | 13 | 36 | 7 | 21 | 7 | 16 | 23 | 44 |
| Canaan | 4 | 20 | 45 | 11 | 5 | — | | 10 | 23 | 23 | 20 |
| Carmichael's Eclipse. | 9 | 16 | 27 | 7 | 48 | 7 | 13 | 7 | 55 | 22 | 53 |
| College Eclipse | 9 | 19 | 51 | 7 | 22 | 8 | 0 | 10 | 39 | 21 | 54 |
| Daphne | 4 | 18 | 43 | 18 | 36 | — | | 7 | 19 | 20 | 14 |
| Yandilla King | 5 | 34 | 28 | 6 | 21 | — | | 6 | 4 | 17 | 27 |
| Anvil | 4 | 23 | 16 | 8 | 35 | — | | 5 | 22 | 26 | 16 |
| Brindle | 4 | 23 | 31 | 9 | 56 | — | | 12 | 31 | 13 | 4 |
| Cad | 5 | 31 | 32 | 6 | 48 | 5 | 47 | — | | — | |
| Editor | 3 | 16 | 51 | 12 | 20 | — | | 14 | 40 | — | |
| Basil | 3 | 22 | 34 | 11 | 2 | 5 | 9 | 10 | 19 | 23 | 0 |
| Le Huguenot | 6 | 16 | 27 | 23 | 37 | — | | 6 | 21 | 10 | 38 |
| College Comeback | 9 | 16 | 26 | 8 | 56 | 5 | 12 | 7 | 19 | 17 | 27 |
| Fancy | 4 | 17 | 24 | 17 | 38 | — | | 8 | 8 | 10 | 43 |
| Cadet | 5 | 30 | 27 | 3 | 49 | 5 | 19 | — | | — | |
| Beardless King | 7 | 21 | 54 | 14 | 52 | — | | 6 | 14 | 9 | 35 |

| Variety. | Selection. | 1911. Bush. | 1911. lbs. | 1910. Bush. | 1910. lbs. | 1909. Bush. | 1909. lbs. | Means. Bush. | Means. lbs. |
|---|---|---|---|---|---|---|---|---|---|
| Queen Fan | 7 | 22 | 35 | 34 | 48 | — | | 20 | 44 |
| Federation | 8 | 11 | 52 | 25 | 48 | 33 | 20 | 19 | 37 |
| Jonathan | 8 | 10 | 26 | 24 | 1 | 27 | 24 | 19 | 26 |
| King's White | 11 | 17 | 0 | 23 | 27 | 29 | 10 | 19 | 0 |
| Marshall's No. 3B | 9 | 7 | 37 | 26 | 38 | 27 | 22 | 18 | 42 |
| King's Red | 11 | 12 | 37 | 22 | 43 | 33 | 41 | 18 | 10 |
| Beardless Gluyas | 11 | 14 | 38 | 20 | 51 | 30 | 35 | 17 | 38 |
| Caliph | 1 | — | | — | | — | | 17 | 11 |
| Gluyas | 11 | 8 | 34 | 21 | 29 | 28 | 33 | 17 | 1 |
| Late Gluyas | 11 | 14 | 4 | 22 | 50 | 33 | 8 | 16 | 53 |
| Canaan | 4 | — | | — | | — | | 16 | 23 |
| Carmichael's Eclipse. | 9 | 26 | 53 | 28 | 21 | 22 | 50 | 16 | 18 |
| College Eclipse | 9 | 12 | 27 | 25 | 8 | 24 | 47 | 16 | 16 |
| Daphne | 4 | — | | — | | — | | 16 | 13 |
| Yandilla King | 5 | — | | — | | — | | 16 | 5 |
| Anvil | 4 | — | | — | | — | | 15 | 52 |
| Bundle | 4 | — | | — | | — | | 14 | 46 |
| Cad | 5 | — | | — | | — | | 14 | 42 |
| Editor | 3 | — | | — | | — | | 14 | 37 |
| Basil | 3 | — | | — | | — | | 14 | 25 |
| Le Huguenot | 6 | — | | — | | — | | 14 | 16 |
| College Comeback | 9 | 8 | 4 | 29 | 12 | 19 | 16 | 13 | 59 |
| Fancy | 4 | — | | — | | — | | 13 | 28 |
| Cadet | 5 | — | | — | | — | | 13 | 12 |
| Beardless King | 7 | — | | — | | — | | 13 | 9 |

In the above tables are shown the yields of certain varieties regularly grown here as farm crops, and also returns obtained from small areas of the latest selections of a larger number. Referring to what may be regarded as bulk crop averages, it will be noted that the records cover two seasons only ; but so far as they have gone, the early types, notably Gluyas, Late Gluyas, and King's White stand out as being the most prolific grain-bearing varieties in the district, notwithstanding the fact that they are too weak in the straw to stand up against spring and summer gales. College Eclipse, which is also an early variety, is usually to be depended upon for a moderate yield under dry conditions, and on that account is always worth a place in the cropping programme ; but in good years it generally falls a little behind the other early wheats grown here. Of the mid-season wheats, Queen Fan, one of Mr. Spafford's valuable productions and an erect grower suitable for hay or grain, has averaged only 2bush. less than King's White ; whilst Caliph and Basil, which ripen about the same time, and were originated by the same plant breeder, have proved very little inferior to it.

Turning to Table XXII., we note that the mean figures for a series of years do not altogether confirm the view expressed above in favor of early wheats. However, it must be recognised that in dealing with plots that rarely attain to an acre, any losses sustained through difficult harvests or other causes will usually affect seriously the calculated yield per acre, and as the early quick-growing types are relatively weaker in the straw, they are the ones most apt to suffer from accidents of this character.

Nevertheless, even in this record of yields, we observe that although three mid-season varieties—Queen Fan, Federation, and Jonathan—lead the way, the wheats that are known to do best in the field come well up on the list. After years of high winds and driving rains such as 1916, there frequently arises a demand for wheats that are stiff in the straw and not prone to go down. And this trend towards rigid types is born of a desire to escape the vexations of a prolonged harvest amongst badly laid crops. It would be prudent, however, for those who are inclined to fly off at a tangent from the old established varieties that have established a claim to be ranked amongst the best bag-filling wheats under our conditions, to ponder seriously over the foolishness of fashioning their system of cropping on the results of a season that is admitted to have been without a parallel in the last 25 years. It is not reasonable to expect wheats that are characterised by extremely rapid growth and capacity to yield plenty of grain, to produce straw that is as strong and tough in the fibre as the slower growing mid-season and late wheats ; but since, in a normal season, we must always expect to find in a district like this that the best returns will be derived from early wheats ; and since it is obvious that farm practice should be founded on average conditions, no satisfactory reason can be advanced in support of the inclination to depart from the existing system which relies mainly on the successful culture of early acclimatised and well-proven types, such as Gluyas and King's Early.

TABLE XXIII.—*Showing Yields of some new College Crossbred Wheats (1910 to 1912 Crosses).*

| Variety. | Selection. | Pedigree. | 1916. B. lbs. | 1915. B. lbs. | 1914. B. lbs. | Means. B. lbs. |
|---|---|---|---|---|---|---|
| Eureka ... | 3 | Fan and Red Fife x Jona (1910)........ | 17 49 | 8 28 | 4 23 | 10 13 |
| Exquisite . | 1 | Gluyas x Indian Runner x Gluyas (1910) | 18 28 | 2 41 | 35 36 | 18 55 |
| Ewer ..... | 1 | Carmichael's Eclipse x Indian Runner x Carmichael's Eclipse (1910) | 31 46 | 3 17 | 10 46 | 15 16 |
| Evening .. | 3 | Gluyas x Indian Runner x Jona (1910). | 29 27 | 23 5 | — | 26 16 |
| Echo...... | 3 | Bearded Rieti x Gluyas x Jonathan (1910) | 10 57 | 5 11 | — | 8 4 |
| Fortune .. | 2 | Marshall's No. 3 x Indian Runner x Marshall's No. 3A x Jona (1911) | 38 43 | — | — | |
| Fane .... | 2 | Marshall's No. 3 x Indian Runner x Marshall's No. 3A x Queen Fan (1911) | 30 43 | — | — | — |
| Forge ..... | 2 | Carmichael's Eclipse x Crossbred 53 (1911) | 29 8 | — | — | — |
| Ford ..... | 2 | Fan x Comeback x Crossbred 53 (1911).. | 22 3 | — | — | — |
| Flamen ... | 2 | College Eclipse x Indian Runner x Marshall's No. 3A x Queen Fan (1911) | 15 9 | — | — | — |
| Fort ...... | 1 | Bearded Rieti x Gluyas x Jonathan x Gluyas (1912) | 14 42 | — | — | — |

TABLE XXIV.—*Showing Yields of Miscellaneous Wheats Grown in Field No. 6A, 1916.*

| Variety. | Selection. | Area. Acres. | Yield per Acre. Bush. | lbs. |
|---|---|---|---|---|
| Crossbred 53 ......................... | 1 | 0·066 | 35 | 21 |
| Yandilla King...................... | 4 | 1·824 | 34 | 48 |
| Turretfield Eclipse ................ | — | 0·713 | 34 | 19 |
| Federation........................ | 7 | 0·912 | 33 | 35 |
| American No. 8 .................. | — | 0·896 | 33 | 28 |
| Correll's No. 7 .................... | — | 0·431 | 28 | 2 |
| Onas ........................... | — | 0·690 | 23 | 12 |

## GENERAL WHEAT AVERAGE.

For the fifth time since 1904, the wheat average on the College Farm has exceeded 20bush. to the acre. At one stage in the harvest it looked as though we should eclipse all previous records this season, but the disappointing return of 16bush. 47lbs. from 44½ acres in Daly's A upset our calculations. We find, however, that notwithstanding the depressing influence of this relatively low yield the average for the year 1916 works out at 24bush. 44lbs., which is only 21lbs. per acre below the 1909 record. The whole of the wheat crop in 1909 was grown after bare fallow, but on account of the unfavorable conditions in 1915, it was impossible to plough up an adequate area of fallow. and hence, in 1916, we find 70 odd acres of wheat sown after autumn ploughing. If we compare the average yields from wheat grown on the bare fallow, wheat rotation in the seasons 1906 and 1916, we find that the figures work out at

25bush. 5lbs. and 25bush. 57lbs. respectively. In the appended table, however, no distinctions of this kind are recognised, the whole area under wheat, exclusive of plots under one acre in area, being taken into account. It would not be difficult to improve upon the mean yield of 17bush. 50lbs. obtained over the past 13 years if we were to concern ourselves solely with the best yielding varieties and ignore the demands for seed wheat of other kinds that yield better elsewhere than they do under Roseworthy College conditions. This, however, would prevent the place from fulfilling one of its most important functions as the State Agricultural College, and hence we accept the general farm average as an indication of the wheat-growing capacity of the farm ; but whilst so doing we are fully cognisant of the fact that the figures are below rather than above the average return that should be obtained in the district.

Table XXV.—*Showing the Average Yields of Wheat on the College Farm, 1904 to 1916.*

| Season. | Rainfall. "Useful." Inches. | Rainfall. Total. Inches. | Area under Wheat. Acres. | Average Yield per Acre. Bush. | Average Yield per Acre. lbs. |
|---|---|---|---|---|---|
| 1904 | 11·60 | 14·70 | 330·00 | 18 | 3 |
| 1905 | 14·23 | 16·71 | 212·00 | 24 | 11 |
| 1906 | 16·31 | 19·73 | 318·00 | 14 | 30 |
| 1907 | 13·96 | 15·13 | 178·00 | 13 | 20 |
| 1908 | 15·52 | 17·75 | 258·52 | 22 | 14 |
| 1909 | 21·15 | 24·05 | 328·47 | 25 | 5 |
| 1910 | 16·79 | 23·87 | 267·35 | 16 | 38 |
| 1911 | 9·45 | 13·68 | 234·98 | 14 | 17 |
| 1912 | 13·05 | 14·97 | 232·89 | 19 | 36 |
| 1913 | 10·82 | 15·66 | 333·07 | 6 | 32 |
| 1914 | 6·12 | 9·36 | 148·69 | 11 | 28 |
| 1915 | 18·33 | 19·76 | 367·271 | 21 | 13 |
| 1916 | 20·25 | 23·23 | 330·937 | 24 | 44 |
| Means for 13 years | 17·58 | 14·55 | — | 17 | 50 |

In conclusion, I wish to record the energetic interest shown in the conduct of the harvest, and the assistance rendered me in the compilation of this report by the Assistant Experimentalist (Mr. R. C. Scott) and the Farm Superintendent (Mr. E. L. Orchard).

# ADVISORY BOARD OF AGRICULTURE.

The monthly meeting of the Advisory Board took place on Wednesday, February 14th, there being present Messrs. F. Coleman (chair), G. Jeffrey, G. R. Laffer, M.P., T. H. Williams, W. J. Colebatch. B.V.Sc., M.R.C.V.S., J. Miller, A. M. Dawkins, C. J. Tuckwell, Professor Perkins, and the Acting Secretary (Mr. H. J. Finnis).

## Conference of Butter Factory Managers.

It was reported that the Minister of Agriculture had approved of the Board's suggestion that a conference of representatives of dairy factories should be held, and had agreed to provide rail tickets to enable the delegates to attend.

## Adelaide-West Coast Transit Facilities.

Further consideration was given the question of providing for the through booking of goods from rail stations on the mainland to stations on the Eyre Peninsula railway and vice versa. Information was received from the Railways Commissioners of Tasmania and New Zealand in relation to the practices adopted under somewhat similar conditions, and after discussion it was decided, on the motion of Mr. Laffer, seconded by Mr. Tuckwell, to direct the attention of the Minister of Agriculture to the arrangements prevailing in the countries referred to, and point out that the Board was of the opinion that if somewhat similar arrangements to one or other could be brought into operation in South Australia, it would be of considerable benefit to the West Coast and other parts.

## Agricultural Education for Women.

Communications were received from the Naracoorte and Sherlock Branches dealing with the admission of women to the membership of Branches. The former asked whether they could nominate a woman as a member of their Branch, and the latter expressed the opinion that "women should be allowed to join all Branches on the same footing as men, Branches to be allowed to make their own arrangements as to when joint or separate meetings should be held." The Board was unable to approve of the admission of women to Branches of the Bureau.

A committee, consisting of the Director of Agriculture, Mr. Laffer, and the Secretary, was appointed to draft and submit to the next meeting of the Board a scheme for the inauguration of women's country clubs.

### PROTECTION OF ROADS.

It was decided to procure from Branches an expression of opinion on various suggestions that had been made in connection with affording more effective protection for roads in country districts, more especially with the idea of limiting the destructive influences of heavy loading. Present legislation (District Councils Act, 1915, section XXII., sub-sections XIX., XX.) empowers district councils to enforce by-laws to regulate, control, or prohibit the passing or travelling in or along the streets and roads of all or any vehicles, and to fix the route by which vehicles shall travel, and to fix the weight of load to be carried. The suggestion has been made, that instead of the regulation of this matter being left in the hands of the district councils, representations should be made to the Government to introduce legislation determining a maximum load to be carried over country roads during the Months of May, June, July, and August at, say, 8 tons gross, and for the remainder of the year, a maximum gross load of, say, 12 tons. With the object of enforcing this provision, it has been suggested that all weighbridges should be licensed, and inspected from time to time. For each load weighed over these, cartnotes should be issued, and a correct counterpart of the note retained by the bridge attendant. An intimation of overloading on this note could be taken as sufficient evidence to convict on a charge of overloading the vehicle in question.

The Width of Tires Act, 1868-9, sets out that no person shall take over a road a load of greater weight than 9cwts. for each inch of width of bearing surface of each wheel. This provision takes no account of the fact that a load of given weight on a (say) 3ft. wheel is very much more destructive from the road point of view than a similar load on a (say) 5ft. wheel of the same width of face. It has been suggested that the Government might be requested to amend existing legislation so as to embody the necessary mechanical principles governing the relation of the diameter of the wheel to the width of face of tire.

The suggestion has also been made that the Government should classify the main road according to traffic, and allocate the main roads grant on the basis of this classification.

### PROTECTION OF PURCHASERS OF NURSERY STOCK.

A Conference resolution was received to the effect that it was desirable that legislation should be enacted to protect purchasers of fruit trees, by making it obligatory for nurserymen to state the class of stock on which varieties were worked. The Board decided that without further evidence of the necessity for protection, it saw no need for the suggested legislation.

### SOLDIERS' FUND.

The 1916 Congress decided that Branches should be asked to secure from members donations of crops, etc., to the South Australian Soldiers' Fund. Whyte-Yarcowie and Orroroo Branches wrote suggesting that the scope of the resolution might be widened to permit Branches to collect from farmers who were not members of the Bureau. The Board approved the request.

### THE BUREAU AND THE WAR.

From Ironbank came a request that the Branch there might be permitted to go into recess until the termination of the war, as the majority of the members were on active service, and the Hon. Secretary (Mr. J. R. Coates) was leaving by the next transport. The Board readily assented, and expressed its high appreciation of the manner in which the Branch has responded to the call of Empire.

### NEW MEMBERS.

To the rolls of existing Branches the names of 58 new members were added.

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## DAIRY AND FARM PRODUCE MARKETS.

A. W. Sandford & Co., Limited, report on March 1st:—

BUTTER.—Exceptionally cool weather ruled during the month of February, and consequently the seasonable diminishing of production is not being experienced at so rapid a rate as usual. There is still a surplus of second and third qualities, but naturally not to the same extent as a month ago, and these continue to be absorbed by the London market, where values still rule at approximately equal to January rates. South Australia continues to import from the eastern States for tops, and local prices in prints at the close of the month were—"Alfa," 1s. 6½d.; "Primus," 1s. 6½d.; third grade creamery, 1s. 2½d. to 1s. 3½d.; choice separators and dairies, 1s. 4d. to 1s. 5½d.; fair quality, 1s. 2d. to 1s. 2½d.; well graded store and collectors', 1s. 1½d. to 1s. 2½d.; off conditioned lots, 1s. to 1s. 1d. per lb.

EGGS.—The market in February recovered very rapidly, and under the stimulus of brisk demand values firmed substantially, so that at the close of the month hen eggs were selling at 11½d.; duck, 1s. 0½d. per dozen.

CHEESE.—Large consignments continue to be received, but find a good outlet locally and interstate. Prices are firmer, values being from 8d. to 9d. per lb. for large to loaf.

HONEY.—Heavy quantities are coming forward, but in spite of that rates have advanced, and all prime samples are selling readily at 4d. to 4½d. per lb., although second grades are slow of sale. Beeswax very scarce at 1s. 7d. per lb.

ALMONDS.—Small lots of the new crop are now arriving, and find very brisk sale locally, whilst export buyers are enquiring for parcels. Brandis, 10d. to 10½d.; mixed soft-shells, 9d. to 9½d.; hardshells, 4½d.; kernels, 1s. 6d. to 1s. 7d. per lb.

BACON.—Supplies are short, curers finding difficulty in coping with demand, Best factory cured sides, 1s. to 1s. 1d.; hams, 1s. 2½d. to 1s. 3½d. per lb.

LIVE POULTRY.—Very active markets have taken place during the month, competition being keen for all quality birds. Turkeys are very scarce, and command high figures. Good heavy-weight table roosters, 4s. to 4s. 9d. each; nice-conditioned cockerels, 2s. 6d. to 3s. 6d.; plump hens, 2s. 4d. to 4s. 6d.; light birds, 2s. to 2s. 3d.; ducks, good, 2s. 3d. to 4s.; light sorts, 1s. 8d. to 2s. 3d.; geese, 3s. 6d. to 4s. 10d.; pigeons, 6½d. each; turkeys, from 10d. to 1s. 2d. per lb. live weight for fair to prime table birds.

POTATOES.—Locally grown potatoes continue to be the largest factor in supplying the Adelaide market. At one point during the past month prices touched £3 per ton, and on that account many growers stopped digging, with the result that rates soon improved. ONIONS.—Thanks mainly to orders from Western Australia, the onion market has been kept well cleared, and although buyers for export have now ceased to operate, the possibility of a glut has been averted. Prices—Potatoes, £4 10s. to £5 per ton on rails Mile End or Port Adelaide. Onions, £6 to £6 10s. per ton on rails Mile End or Port Adelaide.

# THE AGRICULTURAL OUTLOOK.

## REPORT FOR MONTH OF FEBRUARY.

The following reports on the general agricultural condition and outlook of the areas represented by the Government Experimental Farms mentioned below have been prepared by the respective managers:—

*Booborowie.*—Weather—During the month the mornings have been very damp and cold, mist and fog hanging on the hills, like early spring weather. Thunderstorms have been very prevalent in the afternoons, with light misty showers. The majority of days were dull and cloudy. Crops—The bulk of the reaping is finished. Those who had only Federation wheat in were exceedingly fortunate, as it stood up well, and threshed easily; those who have down crops are unable to take them off, the weather being too cold and damp. Natural feed—The tuft grass has kept green throughout the summer, but the dry feed, although plentiful, is spoilt by the continual dampness. Stock is in good condition. Several horses and many sheep have died from colic caused by eating mouldy wheat in the stubble. Miscellaneous—Fallows are rather dirty. Paddy melons and other rubbish are covering them in places, being the result of summer rains.

*Kybybolite.*—Weather—Hot for the first half of the month, followed by cool and unusually wet conditions. the total fall ranging from 2¼in. to 2½in. in different parts of the district. Farmers were fortunately well through their harvesting operations before this fall occurred. Crops—Harvesting operations have been completed in this immediate locality, and the general average yield is quite up to the 15bush. forecast. Threshing operations, where carried out, have been seriously delayed by the rain. Natural Feed—A promising growth has started in the stubbles and pastures; there is also an abundance of dry feed. Stock are in fair to good condition. Pests.—Parrots are proving rather troublesome in fruit gardens.

*Turretfield.*—The weather during the month of February was changeable. No really hot weather was experienced, but sultry conditions prevailed, resulting in several thunderstorms. The rainfall registered was 139 points, but on the three days on which this total was recorded the falls were regular, so that no floods occurred. Crops—Harvesting operations have been completed, but the yields are not turning out up to the earlier expectations, owing to the proportion of crops that was tangled and broken down with the heavy weather experienced in the late spring. Hay carting is now practically finished, and farmers are busy thatching their stacks. Natural Feed—Green feed is growing fast after the recent rains, especially in the stubble where the fallen grains of wheat have been germinated. Mixed with the dry feed this green fodder is making excellent feed for stock. Stock are in fair condition. A number of cows have been lost during the month, and the symptoms point to the cause of death being dry bible. Pests—Mice, rats, sparrows, and starlings are very numerous, and farmers are at a loss to know how to protect the wheat stacks from the ravages of the mice. Miscellaneous—After the rain the cultivation of fallow land has become general, and this work is being pushed on with as fast as possible.

*Veitch.*—Weather—Rainfall for month of February, 260 points; Veitch average for February, 101 points. We have had very unsuitable weather conditions for harvest work, and in some cases in this district the loss of grain has been very heavy. Crops—All crops have now been stripped, and cleaning operations are being forced ahead. Natural Feed—Green feed is now showing up in stubble and scrub. Stock—All in healthy condition. Miscellaneous—Wheat carting teams are now very busy, and the Veitch wheat stacks are growing in size considerably.

## COST OF PRODUCTION.

"What would it cost to produce a bushel of wheat in South Australia, with prevailing high rates of wages and cost of living, on a basis of an average yield of 12bush. to 13bush.?" inquired a correspondent. In replying, the Superintendent of Experiments (Mr. W. J. Spafford) said:—If a man with a plant as is shown below crops 250 acres on bare fallow every year, keeps no stock other than his horses, does nothing other than the work necessary to raise 12bush. to the acre of wheat, and allows himself 9s. a day for all days but Sundays, whether he is working or not, the maximum that it should cost him per bushel will be 3s. 1¾d.

Plant.

| | £ | s. | d. |
|---|---|---|---|
| Six horses | 150 | 0 | 0 |
| One 4-furrow plough | 35 | 0 | 0 |
| One cultivator | 35 | 0 | 0 |
| One set harrows | 7 | 0 | 0 |
| One drill | 35 | 0 | 0 |
| One harvester | 80 | 0 | 0 |
| One wagon | 70 | 0 | 0 |
| Harness | 30 | 0 | 0 |
| Extras | 10 | 0 | 0 |
| | £452 | 0 | 0 |

Above plant should cultivate 250 acres.

| | £ | s. | d. |
|---|---|---|---|
| Ten per cent. depreciation | 45 | 4 | 0 |
| Hay, 30 tons at £1 | 30 | 0 | 0 |
| Repairs, shares, etc | 10 | 0 | 0 |
| Wages, 9s. a day all the year | 140 | 17 | 0 |
| Extra wages | 15 | 0 | 0 |
| Bags at 9s. doz. (less 2-3d. per lb. as wheat) | 31 | 19 | 0 |
| Rent and taxes (5s. per acre per year, 10s.) | 125 | 0 | 0 |
| Superphosphate (½cwt. per acre), at 2s. 6d. | 31 | 5 | 0 |
| Pickling, at 3d. | 3 | 2 | 6 |
| | £432 | 7 | 6 |

250 acres x 12bush. equals 3,000bush.; 3,000bush. — 250bush. for seed equals 2,750bush.; £432 7s. 6d. to produce 2,750bush. equals 3s. 1¾d. per bushel.

To pay for the work, it would cost something like the following:—

| 250 acres yielding 12bush. per acre. | £ | s. | d. |
|---|---|---|---|
| Ploughing, at 5s. | 62 | 10 | 0 |
| Cultivating twice at 2s. 6d., 5s. | 62 | 10 | 0 |
| Harrowing four times, at 9d., 3s. | 37 | 10 | 0 |
| Drilling, 1s. 6d. | 18 | 15 | 0 |
| Seed (1bush. per acre), 4s. | 50 | 0 | 0 |
| Super. (½cwt. per acre), 2s. 6d. | 31 | 5 | 0 |
| Pickling (250bush.), at 3d. | 3 | 2 | 6 |
| Harvesting (bags sewn), 3s. | 37 | 10 | 0 |
| Rent and taxes (5s. for two years), 10s. | 125 | 0 | 0 |
| Bags (less 2-3d. lb. as wheat), 9s. doz. | 31 | 19 | 0 |
| Cartage, at 4d. per bag | 16 | 13 | 4 |
| | £476 | 14 | 10 |

£476 14s. 10d. to produce 3,000 bushels equals 3s. 2d. per bushel.

# THE AGRICULTURAL BUREAU OF SOUTH AUSTRALIA.

## CONFERENCE OF UPPER EYRE'S PENINSULA BRANCHES.

Representatives of the Upper Eyre's Peninsula Branches of the Agricultural Bureau met in Conference at Cowell, on Tuesday, February 27th. In addition to the delegates mentioned hereunder, the Director of Agriculture (Professor Arthur J. Perkins), the Dairy Expert (Mr. P. H. Suter), Messrs. A. M. Dawkins (member), and H. J. Finnis (Acting Secretary) of the Advisory Board of Agriculture attended.

The chair was occupied by Mr. A. O. Dawkins (Chairman of the Elbow Hill Branch). The delegates were:—Elbow Hill Branch—J. C. Busch, A. R. S. Ramsay, G. F. Wake, G. C. Dunn, R. S. Mills, H. J. Wheeler; Salt Creek—J. Abrook, W. Lee, sen., W. Lee, jun., D. A. Venning; Yabmana—J. F. Robertson, H. P. McCallum, G. W. Storey; Yadnarie—A. I. R. Cain, J. J. Deer; Miltalie—W. G. Smith, L. S. Aunger, E. Story, T. J. P. McEachern; Mangalo—J. H. Cleave.

### OPENING ADDRESS.

Mr. A. M. Dawkins, in declaring the Conference open, said the interchange of experience secured by Conferences of that nature, were a means of improving the knowledge of agricultural matters. Experience was a good school, but the tuition was hard, and if they could benefit from the experience of others they would do well. It had been stated that Australia had no system of farming. He held the opinion that the sooner they got down to a system that would work out to be the most productive for the farmer the better. The general practice in his district was to keep sheep and crop once in three years—the system was feed, fallow, wheat. If they were going to rest their land it would be necessary for them to keep some stock, and the keeping of sheep and breeding of lambs fitted in with the wheat growing. At times the sheep would bring in nearly as much as would have been secured had the land been under crop. The system improved the fertility of the land, and a greater average return was secured from the area put under wheat.

He expressed the hope that they would have a successful and profitable gathering, and declared the Conference open.

### HEAVY OR LIGHT DRESSINGS OF SUPER.

Mr. H. P. McCallum, of the Yabmana Branch, contributed a paper under this title. When farmers were puzzled to know what quantity of super. to apply to the land, the difficulty could be overcome, he said, by experiment, carried over three or four seasons. On large holdings he advised large plots. Very often the immediate gain to the farmer from heavy dressings was slight, but the extra expense was more than compensated for by the extra stock that could be carried. Where the bare fallow-wheat system was adopted, it was not necessary to apply heavy dressings unless in a district with a heavy rainfall; 60lbs. per acre was sufficient in that locality. Where the land was cropped every three years 100lbs. per acre would pay handsomely, he said, for although there might not be an immediate return from the wheat, a good crop of feed could be relied upon generally.

The paper was followed by a discussion on the questions raised.

### ROTATION OF CROPS.

"To enable us to get the best results from our land, it is necessary for us to adopt a system of rotation, more especially where takeall is troublesome," said Mr. J. J. Deer, of the Yadnarie Branch, in a paper on rotation cropping. Although not a sure means of prevention, he continued, oats had proved very useful in checking the disease. Land which had been fallowed should be sown with wheat, and the following year it should be drilled with oats, and the third year it should be left out for grazing. The fourth year it should be refallowed, and in subsequent years receive similar treatment in rotation as outlined above. The general adoption of that practice would mean a very large annual production of oats, and it would be necessary to make profitable use of them. All hay cut should be oaten, and oaten grain could be used much more extensively in place of bulkier fodders. Every farmer should carry a good supply of oats loose in a barn; a structure about 27ft. x 15ft. would hold about 600 bags, and built of stone, should cost not more than £75.

An interesting discussion followed. Mr. W. Lee, sen., agreed with the writer of the paper that to store oats in a barn was a good idea. Mr. H. P. McCallum (Yabmana) did not agree that it was workable to take off one crop of wheat in four years; one in three years would be much more satisfactory. He did not see any reason why sheep should not be fed on the oats; he had known cases of farmers who had fed sheep with oats by simply distributing the grain over the ground through the drill. Mr. W. Lee, jun. (Salt Creek) had been growing oats for some years, and he had found the crop very satisfactory.

Mr. W. Hier (Miltalie) had found oats very good for fowls and pigs, and growing that crop in rotation permitted of them being drilled in before the ordinary seeding operations began. Mr. W. G. Smith (Miltalie) advocated the growth of summer fodders.

### THE DAIRY COW.

The Dairy Expert (Mr. P. H. Suter) delivered an address dealing with the treatment of the dairy cow from the time of birth. In connection with the rearing of the calf, he expressed a preference for taking the animal away from its mother after it had been cleaned, say half a day after it had been born. The calf should receive its mother's milk, at a blood temperature, three times daily. It should be kept on that for so long as the beastings were being yielded by the cow, after which it should receive whole milk. A weakened constitution would result if an attempt were made to rear the animal on inferior feed. For the first 10 days it should receive feed three times daily. At the end of a month, by gradually reducing the proportion of whole milk, and increasing the proportion of skim milk, and adding linseed and lime water, its ration could be changed. The addition of lime water to the feed would tend to prevent scours, the occurrence of which in 99 cases out of 100 was the fault of the feeder. In feeding, cleanliness and regularity were of paramount importance.

### WEANING.

At the age of five or six months the calf could, under ordinary circumstances, be weaned from its milk diet. It should be paddocked where it could find a fair living, and be kept in healthy condition. The time at which the animal should be put to the bull depended on the breed, but generally it was a wrong practice to cause heifers to be put in calf at from 12 months to 15 months. In ordinary circumstances the animal should be covered at from 15 months to 20 months, but an animal that early contracted the habit of putting on beef should be put to the bull earlier. The animal should be kept at the bucket for eight or nine months. That was of the utmost importance, because it inculcated a habit of continuous milk making.

The lecturer then dealt with the importance of providing the animals with a sufficiency of nutritious feed, and urged that it was much better to keep four animals on the farm well fed than to carry 14 that were under fed. The necessity for using a bull of proved milking ancestry was emphasized.

At the conclusion of his address Mr. Suter answered a number of questions.

### NEXT CONFERENCE.

It was decided that the next gathering should take place at Cowell, during August, 1918, arrangements to be left in the hands of the Salt Creek Branch.

## FREE PARLIAMENT.

### TRANSIT FACILITIES.

On the motion of Mr. Aunger, seconded by Mr. Hier, it was unanimously decided to support the following resolution carried at the 1916 Conference of Lower Eyre's Peninsula Branches, and extend the wording to include all ports. The resolution read as follows:—"This Conference is of the opinion that the Government should either provide for a State line of steamships to trade between West Coast ports and Port Adelaide, or make provision for the through carriage of goods from the mainland to towns on the West Coast with a through booking charge."

As an illustration as to the necessity for some such provision, it was pointed out that it cost 10s. to send a pig from Cowell to the Abattoirs.

### CO-OPERATIVE FLOUR MILL.

Mr. W. Smith, of the Miltalie Branch, introduced the question of instituting a flour mill on a co-operative basis in this district. It was decided that a member of the Branch should embody its views in the form of a paper, and after the Branches concerned had had the opportunity of considering the proposals, the question could be further discussed at the next Conference.

### WHARFAGE RATES.

On the motion of Mr. Aunger, seconded by Mr. Lee, it was decided to urge the Advisory Board to request the Harbors Board to give to all ports in South Australia the same rates of wharfage and equal facilities to those ruling on the River Murray. The rates and facilities referred to were as follows:—Jetty tolls or wharfage on milk, cream, and small parcels—On every 5-gall. can of milk and cream, 1d.; on every 10-gall. can of milk or cream, 2d.; on every parcel weighing 14lbs. or under, 1d. The wharfage thus payable on milk and cream cans covered the inward and outward dues on shipping, landing, and return. Payment of tolls was made by the owner affixing to the package a jetty toll stamp.

Proceedings were terminated with an address by the Director of Agriculture (Professor Arthur J. Perkins). This will be published in a subsequent issue.

## FRUIT-GROWING ON THE MURRAY.

A prospective settler on the irrigation areas of Berri or Cobdogla has submitted the following questions:—(1) What kind of fruit trees do you advise planting? (2) how many acres of each variety? (3) do you think 20 acres too much for one man with limited capital?

(1) The fruits promising best just at present as being most suitable for this project are orange, apricot, peach, almond, sultana, fig, and lemon, according to the soil and situation of block, says Mr. Quinn, the Horticultural Instructor.

(2) Without a personal knowledge of the last named factors one cannot advise which will be the most suitable and what area is likely to prove available for each. If the soil and situation be appropriate, I consider the orange has the best prospects, and would put in more of that fruit than of any other of the sorts named.

In regard to question 3, Mr. Quinn states that 20 acres is rather much for a man with limited capital. Of course it all depends on what may be called limited. To bring a block of 20 acres into good bearing will involve the command probably of £1,000 spread over four or five years, and then perhaps the owner may need to go out to earn money during a portion of the time whilst waiting.

The question of planting to secure an early return involves more than is apparent on the surface. There is no market of any consequence within reach of Berri or Cobdogla for small quick bearing fruits, and little for vegetable crops. The returns from such crops as potatoes, tomatoes, and onions are very precarious under the collective system of irrigation followed on the Murray, which is designed to meet the needs of fruit trees and grape vines only. A man with command of £500 to £600 capital would do better to select a block of 10 to 15 acres, if obtainable, and then he will have to work very hard and live economically to make a success of the venture.

# RAINFALL TABLE.

The following figures, from data supplied by the Commonwealth Meteorological Department, show the rainfall for the month of and to the end of February, 1917, also the average precipitation to the end of February, and the average annual rainfall.

| Station. | For Feb., 1917. | To end Feb., 1917. | Av'ge. to end Feb. | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| FAR NORTH AND UPPER NORTH. | | | | |
| Oodnadatta | 0·74 | 2·80 | 0·79 | 4·76 |
| Warrina | 0·81 | 2·10 | — | — |
| Tarcoola | 1·63 | 3·79 | 0·55 | 7·58 |
| Hergott | 1·30 | 2·36 | 0·48 | 6·04 |
| Farina | 1·83 | 2·87 | 0·56 | 6·70 |
| Leigh's Creek | 2·77 | 4·59 | 0·50 | 8·66 |
| Beltana | 2·66 | 5·16 | 0·71 | 9·22 |
| Blinman | 1·66 | 3·68 | 0·78 | 12·83 |
| Hookina | 2·01 | 6·81 | — | — |
| Hawker | 2·32 | 6·77 | 0·48 | 12·22 |
| Wilson | 0·93 | 4·47 | 0·61 | 11·78 |
| Gordon | 1·79 | 6·92 | 0·47 | 10·26 |
| Quorn | 0·87 | 4·11 | 0·47 | 13·78 |
| Port Augusta | 0·69 | 2·48 | 0·46 | 9·46 |
| Port Augusta W. | 0·68 | 2·65 | 0·38 | 9·36 |
| Bruce | 0·64 | 3·91 | 0·52 | 10·01 |
| Hammond | 2·96 | 5·85 | 0·49 | 11·46 |
| Wilmington | 0·60 | 3·99 | 0·52 | 18·26 |
| Willowie | 1·73 | 5·13 | 0·54 | 11·90 |
| Melrose | 0·66 | 4·83 | 0·82 | 23·04 |
| Booleroo Centre | 1·34 | 4·67 | 0·53 | 15 83 |
| Port Germein | 1·04 | 2·89 | 0·41 | 12·84 |
| Wirrabara | 1·03 | 3·68 | 0·60 | 18·91 |
| Appila | 1·61 | 3·87 | 0·64 | 15·08 |
| Cradock | 1·54 | 5·57 | 0·63 | 10·86 |
| Carrieton | 2·40 | 6·30 | 0·44 | 12·22 |
| Johnburg | 1·85 | 5·27 | 0·42 | 10·21 |
| Eurelia | 2·00 | 6·27 | 0·48 | 13·24 |
| Orroroo | 2·30 | 5·97 | 0·56 | 13·42 |
| Black Rock | 2·30 | 5·76 | 0·53 | 12·25 |
| Petersburg | 3·05 | 6·43 | 0·51 | 13·07 |
| Yongala | 2·30 | 5·82 | 0·58 | 13·94 |
| NORTH-EAST. | | | | |
| Ucolta | 3·01 | 5·73 | — | — |
| Nackara | 2·47 | 6·47 | — | — |
| Yunta | 2·75 | 6·17 | 0·45 | 8·22 |
| Waukaringa | 2·25 | 4·92 | 0·40 | 7·94 |
| Mannahill | 1·69 | 4·20 | 0·52 | 8·46 |
| Cockburn | 3·35 | 5·89 | 0·54 | 7·97 |
| Broken Hill, NSW | 3·22 | 6·76 | 0·82 | 9·63 |
| LOWER NORTH. | | | | |
| Port Pirie | 1·23 | 3·06 | 0·42 | 13·21 |
| Port Broughton | 1·14 | 1·71 | 0·46 | 14·33 |
| Bute | 1·84 | 2·44 | 0·39 | 15·42 |
| Laura | 1·48 | 3·17 | 0·61 | 18·22 |
| Caltowie | 0·90 | 2·54 | 0·63 | 17·27 |
| Jamestown | 0·96 | 2·59 | 0·60 | 17·46 |
| Gladstone | 1·51 | 2·91 | 0·54 | 16·00 |
| Crystal Brook | 0·62 | 1·96 | 0·55 | 15·62 |
| Georgetown | 1·53 | 3·33 | 0·67 | 18·32 |
| Narridy | 0·85 | 1·96 | 0·57 | 16·79 |
| Redhill | 0·90 | 2·76 | 0·59 | 16·79 |
| Spalding | 0·71 | 1·85 | 0·73 | 20·25 |
| LOWER NORTH—*continued.* | | | | |
| Gulnare | 1·32 | 2·48 | 0·60 | 19·74 |
| Bundaleer W. Wks. | 0·58 | 1·91 | 0·58 | 17·29 |
| Yacka | 1·23 | 2·21 | 0·55 | 15·27 |
| Koolunga | 1·91 | 3·03 | 0·65 | 15·94 |
| Snowtown | 1·94 | 2·74 | 0·43 | 15·70 |
| Brinkworth | 1·09 | 2·36 | 0·60 | 15·48 |
| Blyth | 1·37 | 2·29 | 0·55 | 16·34 |
| Clare | 1·63 | 2·89 | 0·78 | 24·30 |
| Mintaro Central | 1·76 | 3·09 | 0·68 | 21·99 |
| Watervale | 1·78 | 3·55 | 0·71 | 27·17 |
| Auburn | 1·68 | 3·32 | 0·79 | 24·25 |
| Hoyleton | 1·26 | 2·78 | 0·48 | 17·96 |
| Balaklava | 1·97 | 2·46 | 0·47 | 16·03 |
| Port Wakefield | 2·22 | 3·79 | 0·57 | 13·13 |
| Terowie | 1·49 | 4·39 | 0·75 | 13·71 |
| Yarcowie | 2·20 | 4·84 | 0·56 | 13·91 |
| Hallett | 0·81 | 2·12 | 0·55 | 16·40 |
| Mount Bryan | 0·89 | 2·01 | 0·72 | 15·73 |
| Burra | 0·97 | 1·65 | 0·64 | 17·82 |
| Farrell's Flat | 0·87 | 1·37 | 0·60 | 18·87 |
| WEST OF MURRAY RANGE. | | | | |
| Manoora | 1·51 | 2·67 | 0·52 | 18·09 |
| Saddleworth | 1·17 | 2·48 | 0·67 | 19·69 |
| Marrabel | 0·88 | 2·06 | 0·50 | 18·94 |
| Riverton | 1·84 | 3·72 | 0·60 | 20 48 |
| Tarlee | 1·71 | 2·22 | 0·55 | 17·48 |
| Stockport | 1·09 | 1·54 | 0·45 | 15·89 |
| Hamley Bridge | 1·37 | 1·91 | 0·52 | 16·45 |
| Kapunda | 1·00 | 1·75 | 0·65 | 19·67 |
| Freeling | 1·10 | 1·60 | 0·57 | 17·85 |
| Greenock | 1·28 | 1·88 | 0·64 | 21·46 |
| Truro | 1·10 | 2·04 | 0·62 | 19·74 |
| Stockwell | 1·24 | 2·02 | 0·62 | 20·30 |
| Nuriootpa | 0·94 | 1·79 | 0·61 | 21·25 |
| Angaston | 1·21 | 2·06 | 0·64 | 22·25 |
| Tanunda | 1·43 | 1·77 | 0·64 | 22·28 |
| Lyndoch | 1·24 | 1·92 | 0·64 | 23·01 |
| Williamstown | 1·98 | 2·62 | — | — |
| ADELAIDE PLAINS. | | | | |
| Mallala | 1·72 | 2·27 | 0·49 | 16·88 |
| Roseworthy | 1·41 | 2·17 | 0·50 | 17·31 |
| Gawler | 1·95 | 2·73 | 0·65 | 19·21 |
| Two Wells | 1·56 | 2·01 | 0·45 | 16·36 |
| Virginia | 1·99 | 2·41 | 0·49 | 17 58 |
| Smithfield | 2·30 | 2·91 | 0·62 | 17·30 |
| Salisbury | 2·34 | 2·70 | 0·58 | 18·57 |
| North Adelaide | 2·77 | 3·26 | 0·54 | 21·49 |
| Adelaide | 2·40 | 2·84 | 0·62 | 21·04 |
| Brighton | 3·16 | 3·50 | 0·71 | — |
| Glenelg | 2·81 | 3·19 | 0·55 | — |
| Magill | 2·63 | 3·11 | 0·70 | 19·93 |
| Glen Osmond | 2·76 | 3·28 | 0·42 | 25·26 |
| Mitcham | 2·51 | 2·96 | 0·54 | 23·47 |
| Belair | 2·77 | 3·27 | 0·64 | 28·64 |

## RAINFALL—*continued.*

| Station. | For Feb., 1917. | To end Feb., 1917. | Av'ge. to end Feb. | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| MOUNT LOFTY RANGES. | | | | |
| Teatree Gully.... | 2·26 | 2·72 | 0·82 | 28·19 |
| Stirling West ... | 3·10 | 4·16 | 0·99 | 46·70 |
| Uraidla ........ | 2·71 | 3·65 | 0·94 | 44·35 |
| Clarendon ...... | 3·27 | 3·73 | 0·76 | 33·67 |
| Morphett Vale .. | 3·07 | 3·32 | 0·61 | 23·32 |
| Noarlunga ...... | 3·74 | 4·01 | 0·56 | 20·28 |
| Willunga ....... | 3·98 | 4·34 | 0·71 | 25·98 |
| Aldinga ........ | 4·25 | 4·41 | 0·55 | 20·34 |
| Myponga........ | 4·53 | 4·87 | — | — |
| Normanville .... | 3·76 | 4·07 | 0·58 | 20·65 |
| Yankalilla....... | 4·17 | 4·38 | 0·63 | 22·78 |
| Cape Jervis ..... | 2·94 | 3·04 | 0·47 | 16·34 |
| Mount Pleasant . | 1·46 | 2·15 | 0·72 | 26·87 |
| Blumberg ...... | 2·12 | 2·61 | 0·65 | 29·38 |
| Gumeracha ..... | 2·89 | 3·51 | 0·74 | 33·30 |
| Millbrook Reservr. | 2·21 | 2·85 | — | — |
| Lobethal ....... | 1·99 | 2·59 | 0·76 | 35·38 |
| Woodside ....... | 2·18 | 2·74 | 0·82 | 31·87 |
| Hahndorf ....... | 1·70 | 1·98 | 0·76 | 35·45 |
| Nairne ......... | 2·03 | 2·55 | 0·87 | 28·83 |
| Mount Barker ... | 2·29 | 2·91 | 0·89 | 30·93 |
| Echunga ....... | 2·21 | 2·85 | 0·77 | 32·83 |
| Macclesfield ..... | 2·11 | 2·78 | 0·74 | 30·72 |
| Meadows ....... | 2·28 | 3·04 | 0·78 | 35·52 |
| Strathalbyn ..... | 1·44 | 1·90 | 0·69 | 19·28 |
| MURRAY FLATS AND VALLEY. | | | | |
| Wellington ..... | 1·17 | 1·54 | 0·50 | 15·01 |
| Milang ......... | 1·24 | 1·56 | 0·54 | 16·08 |
| Langhorne's Brdg | 1·28 | 1·66 | 0·47 | 15·27 |
| Tailem Bend .... | 2·00 | 2·96 | — | — |
| Murray Bridge .. | 1·09 | 1·37 | 0·50 | 14·32 |
| Callington ...... | 1·48 | 1·87 | 0·56 | 15·65 |
| Mannum ....... | 0·97 | 1·55 | 0·41 | 11·67 |
| Palmer ......... | 1·04 | 1·54 | 0·66 | 15·60 |
| Sedan .......... | 2·21 | 3·03 | 0·44 | 11·92 |
| Swan Reach ..... | 1·43 | 1·87 | — | — |
| Blanchetown .... | 0·35 | 0·67 | 0·53 | — |
| Eudunda........ | 0·97 | 1·47 | 0·55 | 10·71 |
| Sutherlands ..... | 0·91 | 1·35 | 0·43 | 17·33 |
| Morgan ........ | 0·55 | 0·97 | 0·44 | 10·60 |
| Waikerie ....... | 2·00 | 2·55 | — | 9·29 |
| Overland Corner . | 2·67 | 2·97 | 0·58 | 11·42 |
| Renmark ....... | 3·86 | 4·40 | 0·61 | 10·93 |
| Loxton ......... | 4·59 | 5·64 | — | — |
| WEST OF SPENCER'S GULF. | | | | |
| Eucla.......... | 0·28 | 0·75 | 0·57 | 10·13 |
| White Well...... | 0·29 | 1·61 | 0·55 | 9·67 |
| Fowler's Bay ... | 0·57 | 1·32 | 0·46 | 12·11 |
| Penong ......... | 0·54 | 1·52 | 0·84 | 11·93 |
| Murat Bay ..... | 0·41 | 1·72 | — | — |
| Smoky Bay ..... | 0·13 | 1·26 | — | — |
| Petina ......... | 0·20 | 1·82 | — | — |
| Streaky Bay..... | 0·42 | 1·67 | 0·51 | 15·31 |
| Talia .......... | 0·91 | 2·42 | — | — |
| Port Elliston .... | 0·97 | 1·62 | 0·47 | 16·49 |
| Cummins ....... | 1·76 | 2·18 | — | — |
| WEST OF SPENCER'S GULF—*continued.* | | | | |
| Port Lincoln .... | 1·09 | 1·75 | 0·50 | 19·88 |
| Tumby Bay .... | 2·16 | 2·51 | 0·47 | 15·00 |
| Carrow ......... | 3·71 | 4·40 | — | — |
| Arno Bay ...... | 1·49 | 2·19 | — | — |
| Cowell ......... | 1·70 | 2·85 | 0·40 | 11·76 |
| Point Lowly...... | 1·81 | 3·50 | 0·68 | 12·21 |
| Hummock Hill .. | 1·98 | 4·22 | — | — |
| YORKE'S PENINSULA. | | | | |
| Wallaroo......... | 1·66 | 2·01 | 0·39 | 14·05 |
| Kadina ......... | 1·50 | 1·79 | 0·37 | 15·88 |
| Moonta ........ | 2·57 | 2·81 | 0·38 | 15·22 |
| Green's Plains ... | 1·73 | 2·18 | 0·34 | 15·73 |
| Maitland ....... | 2·79 | 3·25 | 0·46 | 20·08 |
| Ardrossan ...... | 1·90 | 2·32 | 0·36 | 13·89 |
| Port Victoria ... | 3·09 | 3·42 | 0·35 | 15·21 |
| Curramulka ..... | 3·72 | 4·09 | 0·36 | 18·50 |
| Minlaton ....... | 3·56 | 3·79 | 0·36 | 17·41 |
| Stansbury ...... | 3·72 | 3·83 | 0·35 | 17·06 |
| Warooka ....... | 4·70 | 4·98 | 0·43 | 17·71 |
| Yorketown ..... | 3·35 | 3·47 | 0·36 | 17·47 |
| Edithburgh ..... | 3·10 | 3·27 | 0·42 | 16·48 |
| Port Vincent .... | 3·60 | 3·88 | — | — |
| SOUTH AND SOUTH-EAST. | | | | |
| Cape Borda ..... | 1·51 | 1·82 | 0·56 | 25·09 |
| Kingscote ...... | 3·86 | 4·16 | 0·44 | 18·95 |
| Penneshaw ..... | 2·74 | 2·89 | 0·55 | 21·34 |
| Cape Willoughby.. | 2·88 | 3·12 | 0·57 | 19·69 |
| Victor Harbor ... | 3·41 | 3·69 | 0·66 | 22·18 |
| Port Elliot ...... | 3·05 | 3·36 | 0·66 | 20·33 |
| Goolwa ......... | 2·42 | 2·77 | 0·60 | 17·93 |
| Pinnaroo ....... | 0·96 | 1·62 | 1·19 | 16·74 |
| Parilla ......... | 0·76 | 1·58 | — | — |
| Lameroo ....... | 0·58 | 1·51 | 0·71 | 16·55 |
| Parrakie ........ | 1·12 | 1·57 | — | — |
| Geranium ...... | 0·95 | 1·34 | — | — |
| Peake .......... | 1·42 | 2·05 | — | — |
| Cooke's Plains .. | 2·35 | 2·69 | 0·42 | 14·74 |
| Meningie ....... | 2·57 | 2·85 | — | — |
| Coomandook .... | 1·85 | 2·24 | — | 17·49 |
| Coonalpyn ...... | 2·05 | 2·38 | 0·48 | 16·80 |
| Tintinara ....... | 0·91 | 1·32 | 0·71 | 18·78 |
| Keith........... | 2·19 | 2·54 | — | — |
| Bordertown ..... | 2·18 | 3·06 | 0·53 | 19·76 |
| Wolseley ....... | 1·35 | 1·75 | 0·43 | 17·72 |
| Frances ........ | 1·60 | 2·38 | 0·51 | 20·74 |
| Naracoorte ..... | 1·52 | 2·16 | 0·64 | 22·60 |
| Penola ......... | 1·56 | 2·01 | 0·80 | 26·78 |
| Lucindale ...... | 0·84 | 1·51 | 0·56 | 23·32 |
| Kingston........ | 1·60 | 2·00 | 0·61 | 24·73 |
| Robe .......... | 1·45 | 2·02 | 0·65 | 24·69 |
| Beachport....... | 2·27 | 2·60 | 0·80 | 27·51 |
| Millicent ....... | 0·96 | 1·36 | 0·88 | 29·25 |
| Kalangadoo ..... | 1·62 | 2·19 | — | 32·00 |
| Mount Gambier . | 1·64 | 2·10 | 1·02 | 26·63 |
| C. Nrthumberland | 1·01 | 1·29 | 0·89 | 18·87 |

# AGRICULTURAL BUREAU REPORTS.

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| Arthurton | * | — | — | Georgetown | * | — | — |
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*No report received during the month of February. † Formal report only received.
‡ Held over until next month.

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# ADVISORY BOARD OF AGRICULTURE.

## Date of Meeting—April 11th, 1917.

# THE AGRICULTURAL BUREAU OF SOUTH AUSTRALIA.

**Every producer should be a member of the Agricultural Bureau. A postcard to the Department of Agriculture will bring information as to the name and address of the secretary of the nearest Branch.**

**If the nearest Branch is too far from the reader's home, the opportunity occurs to form a new one. Write to the department for fuller particulars concerning the work of this institution.**

## REPORTS OF BUREAU MEETINGS.

### UPPER-NORTH DISTRICT.

### (PETERSBURG AND NORTHWARD)

MORCHARD (Average annual rainfall, 11in. to 12in.)

December 9th.—Present: 16 members and three visitors.

To Make Farm Life More Attractive.—In a paper dealing with the problem of making farm life more attractive, Mr. G. W. Gregory said that, owing to the dullness and monotony of farm life, too many farmers' sons abandoned the farm and took up other work. That might be remedied by teaching the boys a better system of farming and stock raising, in order that they might specialise in any particular subject which appealed to them. There was much to be learned from the older countries of Europe, where there were training farms and colleges, conducted on sound, up-to-date, practical, and scientific lines, where the boys might after leaving school, take up any subject for which they had a liking, and not pay for being taught, but receive a salary for their services. By an arrangement of that kind the boy would, in a few years, become an expert in whatever branch he had adopted, and make a success in life. At the present time the cry was for specialists, and farming in all its branches required to be conducted on more scientific methods. Mr. J. W. Riechstein said that farm life was often unattractive because of the great struggle due to the failure of seasons, long hours of work, and the low price of produce through the middleman's profits. Mr. W. Toop said that the taxation of the farming community made farming less attractive. Mr. H. Brown advised that each farmer should set apart a few acres of crop or a certain number of stock for each of the boys, and that the returns should belong to them. Mr. L. G. Toop considered that every son should be given an interest in the farm and encouraged to be progressive and up to date in his methods. Mr. W. S. Twigden said it was unnecessary to send the boys to agricultural colleges if they could be sent to work for a practical farmer for a year or so. Mr. H. A. Tilbrook considered that an agricultural college training was essential for present day farming. Mr. F. Scriven held that agricultural training was exceedingly useful to a young man who intended to engage in mixed farming. Mr. R. Jasper advocated giving sons an interest in the farm, and when times were slack they should be allowed holidays and amusement. Mr. C. Longbotham declared that if farm life were made unattractive there must be bad management somewhere. Perhaps shorter hours, better wages, and better surroundings were required to make the life more congenial to young men.

Garden on the Farm.—Every farmer should have a fruit garden, affirmed Mr. E. A. Stott, in a paper on the garden on the farm, because, he said, it would make the home look more comfortable and the farm more valuable. Two acres in front of the house should be fenced off, wire netted, and planted with fruit trees, about 10ft. apart. It should be well watered, and a supply of seasonable fruit would be always available. In selecting a site for the homestead, consideration should be given to the location of a fruit garden, which could be well watered by floodwaters or sinking. If, when the homestead were built, a few pepper or gum trees were planted in double rows on the north and west sides, about two or three chains from the garden, there would be, by the time the fruit trees were bearing, good shelter from the gales which were so frequently experienced. Mr. W. Toop declared that every farm should produce sufficient fruit and vegetables for the household use. Mr. G. Gregory said that there was a spot on every farm which would grow fruit and vegetables. Mr. W. Twigden pointed out that vegetables were of great help in keeping down the cost of living on the farm. It was also a source of great pleasure. Mr. C. Longbotham was of opinion that vegetables could be grown almost anywhere in the North, with proper care and attention. Mr. R. Jasper urged that every garden should have a breakwind of almond trees, planted back about 40ft. or 50ft., because the almond trees also yielded a return. Mr. J. W. Riechstein advised that only grafted trees should be planted and that both early and late varieties should be put in, in order that there might be always fruit in season. He was averse to the planting of gum trees as a breakwind. Mr. H. Brown emphasised that a garden on the homestead reduced the cost of living, and only required a small amount of work.

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### WILMINGTON (Average annual rainfall, 18.26in.).

February 7th.—Present: nine members.

Home Mixing of Fertilisers v. Manufactured.—In a paper read by a member, comparing the advantages of the home mixing of fertilisers against the purchase of manufactured fertilisers, the writer remarked that it was generally recognised that in order to obtain the highest yields the crop should have the benefit of supplies of certain constituents. It was true that when liberal supplies of farmyard manure were available, it would suffice; but the best system was to make the farmyard manure go as far as possible in moderate dressings, and to supplement it with fertilisers. That being admitted, the question arose of mixing the different fertilisers, and whether the farmer, as often recommended, should buy the different ingredients separately and mix them, or should buy ready-made mixtures. From a farmer's point of view, what were the advantages of home mixing? (1) In general, when considerable quantities were used, there was a saving in the purchase cost of the substances. (2) When separate materials were purchased, it was easier to control the quality. (3) In home mixing, the combination could be so adjusted as to adapt it to the special requirements of the soil and particular crop. The advantages of having the manures mixed by a manufacturer were:—(1) The interests of the manufacturer and the farmer were not opposed. What the manufacturer desired was to supply fertilisers which would produce good crops at a profit to the farmer, in order that the farmer might do well in his farming operations, gain confidence in the use of fertilisers, and so use large quantities. The manufacturers, requiring larger bulks of the fertilising substances, paying cash for them, and knowing the markets, were in a position to buy supplies at much cheaper rates than the farmer, and they could give, in the mixtures they sold, a part of that benefit to the farmer. (2) It was contended that the farmer could control the quality better if he purchased three substances, say, sulphate of ammonia, superphosphate, and potash. To accurately control the quality required three analyses, with three analytical fees, whereas the manufacturer had his own chemist, who could check the quality of the goods delivered to the factory. (3) Most manufacturers were now willing to compound manures according to a given formula or the special prescriptions of the farmer, making a fixed charge for the mixing operation, and giving a guarantee for the quality of the different substances used in the mixing. (4) There was, no doubt, some educational value in a farmer making his own mixtures, but that advantage might easily be overrated and more than weighed down by disadvantages. As a rule the farmer would do better to purchase from a reliable manufacturer. The mixing operation, if performed properly, was not so simple as many people imagined. The different substances required to be first reduced to a very fine powder, the quantities carefully calculated, and then mixed uniformly. To effect that evenness of mixing, they should be turned over several times, passed through fine sieves, and screened. A sample taken of a home-made mixture very rarely yielded the results it should theoretically according to the substances employed. In conclusion, it seemed that a farmer consulted his own interests best by entrusting a manufacturer in whom he had confidence to make his mixtures. At the same time, the farmers should not neglect to study the analysis of their soil, and see that the quality of the manure was appropriate to the requirements of their own soil and the crops they were about to grow.—Mr. T. D. Peek said that the farmer of the future would require to be a chemist, as well as a tiller of the soil. He thought the home mixing of fertilisers would prove to be educational. Messrs. I. G. Schippan and J. F. A. Zimmermann could see no advantages in home mixing, except on experimental plots. Mr. Modystach said that he had tried a mixture of drift sand and sheep manure with excellent results.

## LOWER-NORTH DISTRICT.

### (ADELAIDE TO FARRELL'S FLAT.)

### ANGASTON (Average annual rainfall, 22.25in.).

February 2nd.—Present: 17 members and two visitors.

Lime, and its Action on Land.—A paper on lime and its action on land was read by Mr. J. P. Richardson, as follows:—At one time in the European countries lime was the chief means of improving the land for agricultural purposes, but of late years the practice of liming has greatly decreased. Three reasons may be assigned for this. In the first place, experience has shown that a second application of lime is seldom followed with such good results as the first application. Secondly, during the past 40 or 50 years the use of artificial manures has greatly increased, and, compared with lime, these yield quicker and surer returns. Finally, liming land requires considerable labor, and this becomes scarcer and dearer annually. In spite of these facts, however, an application of lime to land is, under certain conditions, still profitable, although its effects may not be so quick or apparent as those from artificial manures. Although the cost of liming is comparatively high, it must be borne in mind that the effect lasts for several years. Lime is present in combination with many minerals more or less generally throughout the world, but for all that there are soils upon which it is probable that lime is needed as plant food. Generally, however, if lime is required at all in the soil, it is as a stimulant or amendment. Limestone should be burnt before being used for agricultural purposes. As limestone, it is a compound of calcium carbonate, and the burning drives out carbon dioxide, and leaves calcium oxide, or quicklime, as it is generally termed. The more evenly this can be distributed over the soil the better the results will be. Lime greatly improves compact and clay soils, especially if they are in such condition that they tend to bake badly. This improvement is not only due to discouraging denitrification, but also in consequence of the general effect of a more free circulation of air, the creation of conditions more favorable to nitrification, and, finally, also by virtue of increasing the penetrability of the soil by water, whereby surface erosion is greatly lessened. The storage of water in the soil is also increased, and its subsequent capillary movement is better regulated to supplying the needs of plants. Such soils, after being limed, are more easily worked. It is also true of light, sandy, and gravelly soils that the use of lime improves their condition by the mere adding of fine material, which therefore increases their lifting capacity for water. But heavy liming of light soils in hot climates, and especially if they are deficient in organic matter, should be avoided. A second, and perhaps more important, action of lime on the soil is its power of hastening the decay of vegetable and animal matter. This property must not be confused with the caustic or burning action of freshly burned lime, because, when spread on the soil, quicklime very rapidly loses its caustic properties, and becomes what is known as mild lime (especially if the soil is damp), and its presence in the soil in this form creates conditions very favorable to decay. The vegetable matter in the soil, roots, stems, and leaves of plants, &c., whether left there from previous crops or applied in the form of farmyard manure, contains valuable fertilising material, which is useless (except as a mulch) until decay has been effective. The most important property of lime lies in its power of hastening this process, and resolving vegetable matter into the compounds from which it was originally formed, and thus rendering it once again available for plant food. Lime in itself is not a manure. True it is that all plants take lime from the soil, but there are few soils which do not contain more lime than is removed by years of good crops. Everyone is familiar with the action of lime on pasture. The grass is greener and more readily eaten by stock, which do better on it. An application of nitrate of soda produces the same result; so also does a top dressing of stable manure. In each case the greenness of the pasture is due to the same cause, viz., the stimulating effect of a nitrate. In the case of the nitrate of soda and stable manure, the nitrate is added, but in the case of the lime the organic matter in the soil is more readily decomposed by the lime and the nitrates made available for plant use. Nitrogen, however, is only one of the substances whose presence in or absence from the soil determines its fertility. Plants require a supply of phosphorous and potassium also. These two important substances exist in vegetable matter, and also in the mineral parts of soil itself. Like nitrogen, they may be present in considerable quantities without exerting any appreciable influence on the crop yield, due to the fact that they are in compounds which do not make them available for plant food. The natural action of air, water, frost, and other agents in the soil reduce them slowly to forms which stimulate plant growth, but if the land be treated with lime, the process of reduction is accelerated. It must be observed, however, that lime causes what might be termed an unnatural drain of the available stock of nitrates, phosphates, and potassium in the soil. That lime tends to exhaust the soil was well understood by our forefathers, who expressed the fact that its application enriched the father but impoverished the son, and if used without manure it makes both farm and farmer poor. From the foregoing it can be understood why a second application of lime generally fails to produce such a good result as when first applied. But lime has also the property of sinking rapidly into the soil, and this process may go on to such an extent that a fresh application is necessary not only to improve the land for cultivation and allow water to pass through more readily, but also to hasten the decay of the accumulation of vegetable matter and of portions of the subsoil which under a system of thorough tillage are steadily being brought to the surface. Lime has other properties, too, which should be noticed. It destroys acids in sour soils. Plants which grow on sour land or bog, such as sorrel and other coarse grasses, disappear after a treatment of lime, and are replaced by sweeter vegetation. Lime also destroys many insects and slugs. Generally speaking, the best results are obtained from the uses of lime if applied to heavy soils, probably those through which water passes with difficulty; also lighter soils well supplied with vegetable matter, and thereby drained or reclaimed sour lands. Chemical analysis of a soil is not a sure guide as to whether lime is needed. Certainly, to anyone who has a good knowledge of chemistry, it may afford some indication of the probable effects of lime, but landholders should find out by practical experience on a small plot by dressings of lime. If a beneficial result be shown, then the whole field should be done. As regards the time of year to apply lime, that depends on the crop to follow. For instance, if grasses or lucerne are being sown, the lime should be applied three or four months before seeding, but if applied to pasture, then apply in the early autumn, when there is not much risk of rain falling at once and forming the lime into a paste before it has been air-slaked. I take it, however, that the majority of this Bureau would consider the use of lime from a horticultural aspect, and in that case I think the application should be made in the autumn, as soon as the leaves have fallen, or, if not then, I would suggest just before the buds burst in early spring. In either case, harrow as soon as spread. To give the best results lime must be applied in as fine a powder as possible, and also as soon as possible after it has been slaked. The finer it is the more evenly it can be distributed and the more quickly it acts. When applied to stony soils to open them up use from one to two, even three, tons per acre. Generally speaking, the best plan is to cart the fresh lime direct to the land and lay it out in small heaps 6yds. to 8yds. apart and cover with soil and leave until air-slaked. When slaked spread evenly with a shovel. Heaps of 40lbs. 7yds. apart equals 2 tons per acre. The form of lime to buy depends on the price, but generally speaking that will depend on the freight and cartage. Where freight charges are high quicklime will generally be found the cheapest form to use as will be shown by the following:—If 178lbs. of carbonate of lime be freed of the carbon dioxide, it will be found to then weigh 100lbs. only (and this is known as quicklime), so that in every two loads of such carbonate of lime there is really about seven-eighths of a load of carbon dioxide gas, which materially increases the cost of handling. When quicklime is fully water-slaked 100lbs. of it take up 32lbs. of water, thus increasing the weight by one-third. Ordinary air-slaked lime, owing to the fact that in the slaking process it takes in some of the carbon dioxide and some of this again has reverted back to the carbonate of lime, is even more expensive to handle than the water-slaked lime. The longer it is exposed to the air the more it increases in weight until eventually it all reverts back to the carbonate of lime, and the 100lbs. of quicklime thus represents 178lbs. of carbonate. Care should be taken when handling fresh lime, as injury to the eyes might easily occur.

## LONE PINE.

February 13th.—Present: 13 members and three visitors.

PRUNING VINES.—The structure of the wood of the grape vine, and more particularly of the annual shoots, known as canes, with which the pruner was chiefly concerned, remarked Mr. Ted Fromm, in a paper on pruning vines, differed from that of any other kind of fruiting plant. In those shoots was met, for the first time, a clearly defined division of the cane into nodes and internodes. The internode consisted of a large central pith, enclosed in an encircling layer of woody tissue, which, in turn, was enveloped in a thin, close covering of bark, composed of continuous and closely packed fibres. The node, on the other hand, held no central pith, its place being occupied by a wedge-shaped septum, composed of a mass of tissue, less fibrous than the external, which surrounded it. Upon the external woody tissue, where the upper edge of the wedge joined it, the bud was attached. Arising from the soil was the trunk or main stem, from which developed the main arm, or arms, and from those again were developed the secondary arms. From the secondary arm arose those annual shoots or canes which were most valuable, because they bore the buds which produced the crop in the ensuing summer. Hence they might be called the fruiting wood Then there were the other annual growths, which did not take their rise from the ends of the secondary arms, but came direct out of the stem or main arm, or maybe they arose from older portions of the secondary arms. Those growths were commonly known as water shoots. That was owing to their great vigor of growth, and because they emerged from wood more than one season older than themselves. Those water shoots did not, as a rule, carry buds from which fruit could be expected in the following summer, consequently they were not relied upon as fruitbearers. They possessed, however, two points of value—firstly, if a gap existed in framework, an arm to fill it might be developed from the water shoot, or, in the case of secondary arms or spurs becoming exaggerated in length, a properly placed water shoot afforded an opportunity of renewing the said arm or spur. If the water shoot were not needed for either of those purposes, it should be completely cut off. Another type of shoot came from a bud upon the buried portion of the stem. This was called a sucker or an offset. That shoot had no value whatever, and should simply be cut away. In approaching a vine, whether spur or rod pruned, trained as a bush or on trellis, the pruner should observe the vigor of the plant in the growths of last season's canes. If they were numerous and very spindly and weak, it would be advisable to prune hard, allowing a lesser number of spurs or rods, or both, as the case might be, than he observed were left at the previous winter, and just so far as the weakness of the plant indicated, so those spurs should be individually shorter. A very weak rod-pruned vine might need reducing to a few spurs only, as that practice usually resulted in a lessened number of shoots, which were individually stronger. A pruner entering a strange vineyard, might not know for certain what varieties they were, and should therefore observe where the bunches of grapes had been carried, and how many of them. If the shoots arising from the spurs left at the previous pruning had borne fruit freely, then the variety needed spur pruning; but if there was little sign of such a result, rod and spur pruning should be resorted to. The amount of fruiting spurs and rods which should be left differed according to the sizes of the vines. For a vine of moderate strength, in rod and spur pruning, no more than two rods and two spurs should be left. The rods should not exceed more than from 10 to 14 buds, and on a very strong vine double that could be left. In spur pruning, 10 to 12 spurs would be quite sufficient for a vine of moderate size. The vine should not be pruned before all the leaves had fallen, nor when the buds had begun to shoot. A pruner should always cut a rod with one clean cut, which would produce a smooth surface. By making a rough, jagged cut the result would be that in a dry season all vines so pruned would suffer the most. The pruner should bear in mind that the golden rule of permanently successful pruning consisted in establishing and maintaining all the fruiting wood grown from any one vine upon a common level, so that the sap might be distributed evenly to all parts.—Mr. J. G. Hoffmann said that the water shoots should be cut away in summer pruning, when they were young. Members generally agreed with the views expressed in the paper.

## WESTERN DISTRICT.

### KOPPIO (Average annual rainfall, 22.40in.)

February 6th.—Present: six members.

Wheat Variety Tests.—The secretary presented the reports on the wheat variety tests conducted on Mr. G. B. Gardner's farm for the third year in succession. It was to be noted that the average had considerably increased each year. In the current year the average of the six plots was 26bush. 10lbs. per acre, which was 7bush. 15lbs. above last year's average. The plots were sown on land fallowed in August, cultivated in May, and drilled on June 8th with 1bush. of seed and 1cwt. mineral super. per acre. The land was harrowed after the drill. The detailed results were as follows:—Plot No. 1, Federation, yielded 28bush. 44lbs.; plot No. 2 (early), Doris, 25bush. 50lbs.; plot No. 3 (early), Coopers, 26bush. 40lbs.; plot No. 4 (mid season), Dart's Improved, 28bush. 4lbs.; plot No. 5 (mid season), Yandilla King, 26bush. 48lbs.; plot No. 6 (late), West Australian Crossbred, 20bush. 54lbs. The average of the plots for the three years in succession was as follows:—Plot No. 1, Federation, 25bush. 33lbs.; plot No. 2, Doris, 16bush. 2/3lbs.; plot No. 3, Cooper's, 15bush. 25lbs.; plot No. 4, Dart's Improved, 17bush. 13lbs.; plot No. 5, Yandilla King, 15bush. 35 1/3lbs.; plot No. 6, West Australian Cross, 11bush. 37 2/3lbs. The past season, although too wet in the beginning, was very favorable towards the close, good spring rains falling; consequently an excellent sample of grain was produced. Federation was again well ahead of any other variety, thus proving a very suitable wheat for this district.

MINNIPA, January 13th.—Mr. A. J. Godlee read a short paper on straw, which excited considerable discussion. Members agreed that straw was invaluable as a bedding for pigs, but not as food, except in the somewhat unusual case of pigs fed wholly on animal offal, when a little straw would doubtless be useful to balance the high proportion of proteids in the offal. Members also agreed that barley straw was best, both as food and bedding. Mr. L. J. Cook explained the disadvantages of straw as fodder, owing to its bulkiness and the large proportion of fibre it contained. Mr. E. J. Turley said it was beneficial to feed straw to milch cows in the morning prior to green lucerne. Horses preferred old thatch straw to clean oaten straw. Mr. G. V. Lindquist contended that where harvesters were used it was better not to save the cocky chaff, but to cut and preserve the straw instead, because the food value of straw was greater. Wheat, when fed to horses with straw or cocky chaff, should be given half in its raw state and half boiled, before being mixed with the chaff. There was no danger in feeding wheat to horses, provided they were turned loose in a grass paddock at night. Mr. A. Yates said that he had done six weeks' carting with an eight horse team, which was fed on 15lbs. to 20lbs. of wheat per head per day with cocky chaff.

## EASTERN DISTRICT.

## (EAST OF MOUNT LOFTY RANGES.)

### RENMARK (Average annual rainfall, 10.93in.).

Dipping and Drying the Sultana.—A paper was read by Mr. H. Showell on dipping and drying the Sultana, as follows:—"In this paper I treat only of Sultanas, as I have not much experience with other varieties of grapes; but the same principles will apply to all dipped grapes with suitable variations. For convenience, it will be divided into three parts—1st, the fruit; 2nd, the dip; 3rd, drying and after treatment. 1. *The Fruit.*—Little need be said of this; it is a determined factor by harvest time. Fruit that has been checked from want of water in the swelling and ripening stage will not dry well either as to looks, color, or weight. The same applies to fruit from salty land. It is desirable for fruit to be freshly picked, though by altering the dip no appreciable difference in result will be found in fruit up to several days old, or even a longer period. I do not find that brown fruit dries a bad color; the best of all is the whitish, very slightly amber, fruit that looks like crystallised honey. The most difficult fruit to dip is the heavily shaded green fruit, even though ripe. 2. *The Dip*—All dipping is a compromise to get best average from the different qualities of fruit in a tin. It does not seem practicable to make two pickings. This compromise is further complicated by the fact that in a tin all the fruit does not receive the same 'dip,' either as to time or temperature. Every tin will have over and under dipped fruit, and some will be just right; also, if left long in the tin the centre fruit gets over cooked. It is an advantage to follow with a cold dip, to cool the fruit. This should not be plain water, but soda, about the same strength as the dip; two to four buckets should always be cooling, and changed after each run. Greeny or whitish spots on the dipped grapes are due to insufficient action of the dip. When the grapes are pressed tightly together, where two grapes touch will be a spot more or less unaffected by the dip. This effect is more frequently met with when grapes are picked, carted, and dipped in the same tins, as they pack down very close. The effect is not very apparent on the finished article, especially if well sweated. There are many combinations of strength, temperature, and time, within limits, which all furnish much the same results. Thus, if the temperature is too low, longer and stronger will equalise matters, or longer above; but color will suffer if the temperature is raised to compensate for weakness or a too quick dip. There is an optimum of all three which will give best results on the individual fruit. For determining this I can lay down no definite rule. Personally, I empty the dip daily, as I put through 700 to 800 cases in that time. This is not absolutely necessary—within limits, the color of the dip will not affect fruit, unless it splits badly, when the cracks will show dark edges. If not too dirty, an old dip is no disadvantage; per contra, a new dip is equally efficient as an old one. Strength may vary within wide limits. My usual is from 12 to 18 to 1. The usual way of stating stength is in gallons of water to 1lb. soda, thus 20 to 1 would be 1lb. soda to 20galls. of water—really ½ per cent. No rule can be made for strength; it must be varied to suit the varying qualities of fruit, especially if they turn in the early part of the season. I endeavor to crack the fruit as little as possible. Early green fruit will crack badly; late and ripe fruit not at all visibly. Visible cracks are not necessary; on green fruit, early in the harvest, they cannot be avoided; later on there should be no trouble with over-cracked fruit. The time of the immersion varies with the man. I adopt a steady stroke, and do not vary it, but vary the dip to suit the stroke. After 3 p.m. a man unconsciously dips slower, and I weaken the dip in soda and temperature to balance this. The nose of the basket should be dipped first, and the dip thrown back over the grapes. Never dip straight down and up—the bottom will be much over-dipped if the top gets enough, unless a very slow stroke is used. The temperature of the dip is the crucial point in getting even color. Most dips go off in the afternoon; this is not due to dirty dip, as supposed, but to the fact that the fruit, being hot itself, gets over dipped. The temperature must be varied to suit—first, the weather, and next, the time of day. I usually start about 204deg. or 206deg. on the previous day's fruit, drop to 202deg. on new fruit, drop to 200deg. at 10 o'clock, and 198deg. after dinner; then, at 3 p.m. drop again to 196deg. or 194deg., according to the day—on a very hot day even lower. The thermometer outside the dip is as important as that within, if one desires color. I keep the dip within 1deg. of the temperature I determine on, and to secure this use steam heating. It could not be done so evenly on a fire dip, though many men are very skilful in keeping an even temperature. It is very fortunate that a simmering dip is automatically about 204deg., and about right for the morning, though too hot for the afternoon, except on cold days. This is why so many get dark fruit in the afternoon. Using the above methods I last year turned out, for the first time, the whole of the fruit treated on my home ground as 3 and 4 crown, with no picking over whatever. Every pound of fruit put in—about 14 tons—was redipped for dust, some of it twice, in a cold soda dip. This shows the quality, as even after that depreciation it was still 3 crown. Of course the season was favorable. Such a result could not be obtained in bad weather, but even with the best of weather it is notorious that many men cannot turn out even a day's work of even quality. As is well known I use the ordinary methods of chemical analysis to determine and keep the strength of dip even. I need not elaborate on that now. If the temperature is carefully regulated the strength of dip, whilst a big factor, is, within wide limits, of less importance. I prefer not to put the fruit through too quickly. It is evident there will be less difference between one part of a basket of fruit and another if the time of immersion is increased by reducing the temperature and strength than if a very rapid dip were practised using the limit in strength and heat. Try the experiment of dipping a long thin bunch down and up as rapidly as possible in a very strong, say 2 to 1 dip at about 204 deg. You will find the tip dries nearly black, the middle dark, the top just right, and the extreme top insufficiently dipped. A difficulty sometimes met is a white deposit on the rasins, especially on the Gordos. This is due, not to too strong a dip, as commonly supposed, but to insufficient strength, a cold soda dip following the hot one will as a rule do away with the trouble. 3. *Drying and After Treatment.*—I have entirely given up trays on my home drying ground, excepting in emergency, and dry all on racks, and the system I am converting everything to is a galvanized-iron-roofed double rack of eight tiers each, which latter are moveable. This can be seen on my place, so I will not go into details. In spreading, I have tried many devices, but have found nothing better than hand work. The fruit should not entirely cover the wire, so as to block the air ascending through the tiers. I get 5¾ tons to 6 tons of dry fruit off a double rack 100yds. long, eight tiers deep, equal to 1,600yds. of netting 4ft. wide. The actual dried weight taken off a given rack will vary according to the ripeness of the fruit. This rack gives every satisfaction, and a better color than trays. The bottom tier is, of course, covered with hessian. When sufficiently dry the fruit is knocked down on this and if possible left for a day or two to sweat (unless the weather is bad). It is then placed in half sweat boxes and cross stacked in a shed for 10 days or more to sweat up before it is boxed. By this, one avoids sending in damp fruit, and it stems better; also the fruit can be got in much damper as drying will proceed and finish in the shed. If the weather is threatening, I do not hesitate to run fruit in, in this way, even if only seven-eighths dry. It is easy to carry boxes out and turn over for a day or two to finish if it does not do so itself in the shed. These storage sheds repay the cost in a single season. The fruit can be saved from risk of rain and can be inspected and blended if necessary without trouble or risk when boxing up. I regard this as a very vital part of the operation. It needs a good supply of sweat boxes. I have over 1,000 in use on the one drying ground. This will equal about 10 boxes for each ton of fruit harvested and is none to many. I regard the sweat box as part of the drying plant, and not for storage and delivery only. There is the added advantage that fruit can be accumulated until there is time to cart it away. It can be rushed in while the weather is fine and boxed up when there is a lull owing to weather, or being full up. I do not hand grade any fruit; if it wants hand picking the odds are it will not be improved a grade by the process, and you have lost your labor, and created a quantity of still lower grade fruit in so doing. In conclusion, I can lay down no royal road to secure a good grade; the fruit, the weather, and the dipper must all be studied and the principles I have tried to explain applied as necessary. The time the drying takes is of minor importance, provided there is not too much damp weather. If drying goes on continuously, equal results can be obtained whether the time be five days or 15 days. The worst weather of all is hot, muggy, humid weather, especially early in the season, when the sugar content is low and the grapes watery. The grapes will take little hurt in cold, windy weather. I have not found that there is any difference in quality between cinctured and uncinctured grapes, so far as drying goes, either in color or weight. If anything the cinctured fruit may tend to be more elongated and slightly whiter than the uncinctured. The cinctured fruit stands better on the vines than that not treated, so far as hanging late in the season goes—possibly because it is slightly later in ripening. A point that needs attention is the question of after treatment in the packing shed, to sterilize the fruit and prevent its going grubby. I have made some experiments in this direction, but so far without much result. The sulphuring of Sultanas I have definitely turned down; the technical difficulties are great and even if successful the result does not appear to be satisfactory. Basket dipping is not altogether the best method, especially when the fruit is picked and carted in the same tins, as the berries tend to pack together, preventing the dip penetrating. The old tray dip gave better results, but is not very workable in practice. A very great improvement would be an automatic dip to run the fruit through thinly on a belt. At least a day's time in drying, or even more, could be saved by each bunch being dipped exactly the right amount, as cannot be done in a deep basket. I intend to experiment in this direction and believe that if this could be worked out satisfactorily, one could rely on turning out four crown consistently, given good weather and good fruit. In conclusion apply the following rules:—The strength of the dip is regulated to suit the quality of fruit, that is to attain the desired disintegration of the skin and change color from purple to brown. Temperature is regulated to get the depth of color desired from brown to golden. Time in the dip should be an easy stroke for the dipper and other conditions varied to suit him. The dip had better err on the strong side if anything. The temperature, if a light color is desired, should err on the cool side, but not so much as to make fruit slow in drying. Both under and over dipping will cause fruit to dry slowly; the first because the skin is not sufficiently affected; the second because sugar leaks out and seals the cracks up. While considerable variation in strength of dip is admissable, rule of thumb methods are too erratic to get consistent results. I have had samples brought to me so weak that they were drinkable. Let each grower conduct experiment for himself in however small a way and so that in time we can rely on turning out a guaranteed sample. It is bad enough to get low grade through bad weather, without getting it when everything is favorable. The settlements in any ordinary season ought to turn out at least 80 per cent. of 3 and 4 crown fruit. Until the time arrives—if it ever does—that dipping and drying are on exact, set lines, every grower must depend, to a large extent, on his own expertness in adjusting methods to the varying conditions of weather and fruit. If anything in this paper is not clear, I shall be pleased to see any of you at my drying ground when actually working next month, and give any information I can. There are no trade secrets in fruit drying so far as I am concerned. The better the settlement can do, the better for each one of us individually. Supplementary to his paper, Mr. Showell stated that the average strength of dip used for the Sultana would be about 14 to 1. The whole secret of getting good-colored fruit depended on observing the temperature of the grape and the temperature of the dip.—Mr. Basey said that Renmark Sultana growers owed a great deal to Mr. Showell, who had been the first to work out and apply the Burette system of testing, and had also first struck the idea of varying temperature. He agreed that a high temperature was a mistake, but questioned the superiority of newly picked fruit. In his experience best results were obtained from fruit that had been picked a couple of days; and one year, when heavy rain delayed drying operations, he had made very good Sultanas out of fruit that had been in the tins for a week, using a 10 to 1 dip. (Mr. Showell thought that early dipping was best for greenish fruit.) Mr. Showell's advice to have plenty of sweat boxes was right, but it was a counsel of perfection. Mr. Showell said that what was spent on sweats was saved in trays. Mr. Howie remarked that Sultanas had set very heavily this year, bunches weighing 5lbs. or 6lbs. being frequent. He asked whether Mr. Showell still adopted the practice of splitting the bunches. Mr. Showell said that he always split them. Formerly the bunches were cut on the trays, but now that the racks were in use, they had to be cut when they were picked. It meant more loose berries, but was safer than drying them uncut. Mr. Waters understood that all the Sultanas on the English market were sulphured, and wondered whether it would pay Renmark growers to sulphur for export purposes. Mr. Howie said that the high-grade Sultanas in England were certainly sulphured, but it was a difficult thing to find out at what point in the drying operations the sulphur was used. Mr. Showell questioned the alleged sulphuring of the bulk of the English fruit. It was not practicable to sulphur Sultanas on racks, and he certainly did not intend to kill himself by trying to dry 100 tons on trays. Mr. Cole had sent some sulphured Sultanas to London, and had received a very discouraging report about them; also similar fruit was sold in the State as 4-crown. When he was in the trade in London, 25 years ago, there were no sulphured Sultanas on the market. Mr. Agars had known Sultanas sulphured for three or four hours after dipping in Mildura. Answering a question about the second (cold) dip, Mr. Showell said that it served to cool the fruit, thus preventing the centre of the bunch from getting over-dipped; it helped the darker berries, and removed the whitish appearance sometimes found on the berries. Mr. Basey had tried the cold dip, but had turned it down. Certainly he was working on a smaller scale than Mr. Showell, and the fruit was never long in the tins. He had not found any advantage in the practice. Replying to a question regarding the relative qualities of fruit dried on trays and racks, Mr. Showell said that the rack-dried fruit averaged half a crown better quality than that dried on trays. His manager, Mr. Alexander, had tested half a ton last year, and the fruit on the trays dried out at least half-crown lower than that on the racks. Mr. Basey got the better quality on trays. Mr. Showell had poor results from the racks at first. The right methods came with experience. On the question of the frequent changing of the dip, Mr. Basey mentioned that the late Mr. Alf. Johns, who always dried a good sample of fruit, used to go through the whole season with the same dip; he used it fairly strong and fairly hot—about 198deg. A high temperature was undoubtedly a mistake. The maintenance of a right temperature depended largely on having water handy to the dip. His practice was to keep a kerosine tin of water, with a nail hole in the bottom of the tin, on the edge of the dip, which thus received a continuous jet of water. Care had to be used in firing with green as well as dry wood. With regard to his advice to dip the basket nose first, Mr. Showell said he was aware that Mr. Muspratt dipped straight up and down, but he used a very slow dip. Nose first was the safer plan. Answering a question as to the addition of soda to the dip, Mr. Showell said that last year he had added ½lb. after every 40 tins; he used from 5lbs. to 7lbs. to a ton of fruit, instead of 15lbs., as formerly. If the fruit were dipped before it had a chance to split and sugar, a great saving in soda was effected. He would give them a tip. If they had Sultanas under dipped, and looking dull and rusty, it was a good plan to crush some ripe grapes and sprinkle the juice over the fruit spread, after sweating, on hessian. Questioned concerning the green color that sometimes occurred in fruit boxed straight off the rack, Mr. Showell said that he always had his fruit on hessian before boxing. Fruit evened up after it had been a month in the sweat, and that was one of the advantages of a good storage shed. Last year he had 30 tons of Sultanas in the shed before carting any in to the grader. For taking fruit off the rack he had found time. Pegs were far better than nails for fastening hessian for side covers, and pinning up the hessian edges when taking off the fruit. They were extremely cheap if bought by the box. Racks cost more than trays in the first instance, but there was a big saving in depreciation. A rack to dry six tons at a time was equal to from 5,000 to 6,000 trays, reckoning that the rack could be used only three times in the season and the trays five times. In normal times, and on very rough reckoning, such a rack would cost £200, as against a cost of £150 in trays. On present prices the cost would be nearly 50 per cent. more. He was unable to formulate a rough-and-ready test to tell when fruit was dipped right. It was a matter of instinct. Mr. Basey said that his method was to take one of the white opaque berries, and if he could just find a crack in the skin he knew the dip was right. Mr. Showell said that if there were hot winds, and the fruit was wilted, none of it would crack. The early fruit was very difficult to deal with—the margin either way was very small; it was easy to dip when the fruit was ripe. Allowance had to be made for fruit from different blocks, and sometimes even for fruit from different parts of the same block. He varied the dip for every block, and sometimes from one end of a block to another, until the fruit was dead ripe at the end of the season; then it was all pretty well the same. Ripening was delayed by too much water, and also by too little. For a small grower, dipping half of each day, the better plan would probably be to pick in the afternoon and dip next morning. The dip should affect the skin only, and never the fruit, and after the grapes had been dipped the skins should still be acid, and not alkaline. If there were alkaline, the fruit was being over-dipped. It did not hurt fruit to be stale before dipping; he had dipped fruit two weeks after picking, and had got good results, using a stronger dip than usual.

[This paper was read at a meeting of the Branch held early in 1916.—Ed.]

## POMPOOTA.

January 29th.—Present: 35 members.

Dairying.—In an address on dairying, Mr. G. Lane said that he based his remarks on a practical experience of 20 years. Returns from dairy cows were usually calculated on a nine months' basis, but he considered the basis should be 10½ months milking and 1½ months dry. A cow should, at least, average 2½galls. per day for 10½ months. He knew of an instance at Murray Bridge where, during the winter months, 43 cows averaged 3galls. and 2lbs. of milk per day. In managing dairy cows kindness and cleanliness were essential, and the animals should be made pets as far as possible. In winter cows needed one-third more feed than in summer. They should also have plenty of good clean water to drink. He advised adhering to lucerne, barley, and maize for feeding. He had taken 60 tons of maize per acre off swamp land, and a yield of 24 tons per acre was quite possible on irrigated land. It was not profitable to graze cows, and he gave an instance in which 45 cows in nine months gave better returns than 120 which were grazed. He did not recommend rugging cows, owing to the changeable nature of the climate. It was better to erect a shed, where they could obtain shelter when they required it. He favored rearing calves, but the cow should be the first consideration. A calf should be given 2galls. of skim milk per day.

BOOKPURNONG EAST, February 17th.—A long and interesting discussion took place on the use of the traction engine on the farm instead of horses.

MONARTO SOUTH, February 10th.—The sampling of wheat, usual at the first meeting after harvest, took place. There were 12 samples, ranging from 61½lbs. to 65½lbs. per bushel. The average was fixed at 63¾lbs. to the bushel.

## SOUTH AND HILLS DISTRICT.

### CYGNET RIVER.

February 1st.—Present: seven members and one visitor.

Dairy Cows on the Farm.—To make a success of dairying, remarked Mr. W. J. Weatherspoon, in a paper on dairy cows on the farm, the cows must be given the proper class of feed. It was not sufficient to turn cows into good grazing paddocks, because they required bran and chaff, and, the last thing at night, should be given long hay, cut on the green side. They also required plenty of good clean water at all times. Each cow should be tied up when being fed, in order that each might receive its proper quantity. Sorghum and maize could be grown along the Cygnet River, and lucerne could also be profitably produced without irrigation. A few acres of barley or rye should be sown for early green feed. He preferred the Shorthorn-Jersey crossbreed, because they were good milkers and were a handy weight for the butchers when they had finished. Bulls for stud purposes should be pure bred, with a heavy milking strain on both sides of the pedigree. Cows required protection against winter storms, and half an acre of scrub should be provided on the farm for shelter. Mr. Loader contended that it would pay to rug cows, because heat required to maintain the warmth of the body would be utilised for producing milk. The extra milk would pay for the rugs in a few weeks. In answer to a question, Mr. Weatherspoon said he would dry off a cow from six weeks to three months before calving. Unless cows were milked regularly and quite dry, they would very soon go off their milk. If well fed and well milked they could easily be kept in milk for nine or ten months.

### INMAN VALLEY (Average annual rainfall, 26in. to 27in.).

February 8th.—Present: 13 members.

Fruit Culture.—Taking it that the rainfall in that district was sufficient, or almost always sufficient, remarked Mr. J. W. Crompton, in a paper on fruit culture, it was not necessary to choose a specially fertile soil, for the greater the rainfall the poorer the soil might be. It was best to choose a soil that was easy to work, and a subsoil that would hold moisture well, and yet was porous, such as a red or yellow clay, or, better still, a clay with broken, decomposing stone all through it. It was also an advantage to have a small soakage of water passing deep below the surface; but those often suffered more severely in a droughty year than a deep clay. Protection from wind was very important, and an eastern aspect was the best in that district, as almost everywhere else. The east and south-east winds could do harm, but they were not so destructive as the winds from other quarters, and not so prevalent. The use of explosives in the soil depended upon the nature of the subsoil, and whether it was a standing orchard or land being prepared. In preparation it often paid. The soil should be very dry or very wet—preferably very dry. The depth depended upon the object of the explosion and the nature of the subsoil. It was often advisable to blast in summer the spot where each tree was to be planted the following winter, tamping the charge tightly with bonedust. The tamping should not be blown into the air, but the effect of the change should be apparent on the surface. An old auger, with the wings cut off, and assisted by a little water, was the best tool for making the holes. It soon became blunt, but if heated and tapped with a small hammer its keenness was easily restored. After blasting holes for planting, each hole should be bored out as if for a post, in order to ascertain that there were no big air spaces left. Those might be settled with a crowbar, and the hole filled in again with loose soil, and the bonedust tamping which had not been scattered by the explosion. When about to plant an orchard, blasting should be preceded by a deep ploughing and removing stumps and roots. The lines should be set up, and each position for a tree pegged. If all the measuring were done exactly horizontally, the rows would be straight; but if the measuring were done on the surface of the ground, and the ground was an uneven slope, the rows would be crooked, but the ploughing would come fairly even. That applied most where the orchard was to be so laid out that it could be ploughed three ways. The base pegs should not be marking tree holes, and should be firmly set, because if blasting were to be done, every other peg would be moved, and would require to be replaced later. After ploughing, pegging, and blasting, a heavily manured crop of peas should be planted, and the ground pegged again before the winter. Before the peas had developed much growth a square could be dug around each peg, and the tree planted 3ft. from the standing peas, which could be ploughed in during the spring. Where there was plenty of stable manure available, it might be spread over the whole surface, and the peas planted in it, but in most cases there was only sufficient to dig in close to each young tree. If blasting were not necessary, the holes should be dug out and manured deeply; but if the soil were blasted, a pint to a quart of bonedust should be forced well down among the cracks and the top soil manured. If there were no stable manure procurable, the peas would make a good substitute, as well as a good companion to it. In planting, great care should be taken that the roots were not doubled up, and there should be no badly torn ends, if they were not still in their own soil. The roots should not be pulled about more than was absolutely necessary. The tree should be lowered into the hole with the best roots directed towards the prevailing wind. The soil should be shaken in by hand, and pressed down occasionally. When the hole had been filled, and the tree buried a few inches above the crown of the roots the soil should be stamped on, or, better still, watered. The top should be cut back to the height at which it was to divide. Nothing should be cut very closely except sucker shoots, and nothing should be left standing sideways more than 4in. at the very most. It was easier to prune before planting. For a young tree to grow six even shoots was plenty for the first season's growth. A small tree like that did not cover much ground, and there was always a temptation to grow something between them; but barley as a green feed crop was inadvisable while the trees were small, because it encouraged blights and absorbed the manure of the trees unless it was dug round two or three times. Berseem was better, because it was not so tall, and was leguminous. If treated wisely, it did good to the tree when the last of it was ploughed in. To go on growing peas for green manuring certainly paid. If it were possible to turn out three tons to the acre of potatoes, it would pay to manure a pea crop for the winter, to plough it in, and plant potatoes. That was if average prices prevailed. If it would pay to grow potatoes between the trees, they could be planted each year until the trees were too big to be cultivated only one way. Onions could be put in for a change on less manure, or even none, after potatoes. When the trees were bigger, and beginning to bear, barley might be planted, and it would not do much harm, but would be in the way a little, perhaps. If barley were sown, the land should be ploughed as soon as the barley was off, and it should never be left late. Room should be made for summer cultivation, and little else was needed, except spraying, because the trees had been given a good start.

### MOUNT BARKER (Average annual rainfall, 30.93in.).

February 7th.—Present: 46 members and two visitors.

Raising New Varieties of Potatoes.—About eight years ago, premised Mr. F. A. Joyner, in a paper entitled "Notes and experiments in raising new varieties of potatoes," he laid plans for attempting the production of new commercially valuable varieties of that universally used vegetable, the potato. Little did he anticipate the problems to be encountered. The experiment had been begun, and was still being carried on at Bridgewater, not an ideal spot for the purpose owing to the fact that the district was much subject to the visitation of frosts.

Unfortunately, Nature had placed a barrier in the road of production of new kinds from many of the best potatoes. He referred, of course, to production from actual seed, and not from so-called seed tubers. Many varieties were sterile, in that their flowers did not produce fertile pollen, and in some cases they did not produce any pollen at all. Again, some varieties appeared to possess infertile female organs, that was to say, the pistil of such a variety was defective in some particular. Either the stigma was not receptive to pollen, or the style did not permit of the passage of its tube growths, or possibly the ovary was deficient. The absence of fertile pollen was commen to practically all varieties bearing light heliotrope flowers, although he had found fertile pollen in the flowers of one such variety, namely, ''Mayfield Blossom.'' Some growers had claimed that they had produced new varieties by crossing ''Up-to-date,'' which had light heliotrope flowers, but his experience with that variety had been unhappy. After a very great number of attempts he was able, on one occasion only, to successfully impregnate the stigma of an ''Up-to-date'' flower, and, as ill-luck would have it, the seed berry which followed was, whilst quite immature, broken off the plant by a falling apple tree prop. Many difficulties resulted in the loss of a season or two before successful cross-fertilisation was systematically established, and it was not until 1911 that the crossings were at all extensive. It was perhaps unnecessary to say much about the potato plant itself. They were all, he expected, quite as, if not more familiar with it than he was. The general appearance of the flower was, however, probably well known to all of them, seeing that potatoes were so largely grown in the district. It bore, as a rule, five stamens, arranged around a central organ—the pistil—the head of which, the stigma, protruded above the stamens. Each stamen bore, at its head, an anther, which was the pollen-bearing vessel, from the extremities of which the pollen, if present, was shed and fell on the stigma. The pollen there, in a sense, took root and sent down the style of the pistil thread-like tubes which, entering the ovary at the base of the pistil, discharged the male fertilising elements, which pierced the ovules and combined with the female nuclei. This was the act of fertilisation. The flowers were borne in umbels on stems about an inch long. Those stems, about midway in their length, had a ring or joint of sappy, cork-like substance which rendered the flower a ticklish subject to handle, for it broke off very readily at this ring or joint. It was rather an extraordinary fact that those flowers whose anthers bore no pollen broke off much more readily than those which bore pollen. In order to cross-fertilise a chosen plant, it was prudent to remove the anthers from its flower before the pollen was ripe. That precaution was really not necessary in the case of flowers whose anthers contained no pollen, but it was wiser in every case to remove the anthers, as it was sometimes difficult to determine whether pollen were present or not. The removal of the anthers was usually effected with fine emasculating scissors. He had, however, a method of his own. Taking hold of the flower just before it opened, he parted the petals, and with a finely pointed little stick, about the size of a wooden match, bent each stamen away from the pistil. If the flower were treated before it opened, the stamen would be found quite brittle, and it would readily break off at its base. The anthers, they would remember, were attached to and formed part of the stamens. The flowers so treated were left for a day or two until the stigma was ready to receive the pollen collected from the other variety which had been chosen as the male parent. When the stigma was so ready could be determined, because it became slightly sticky, and exuded a viscid liquid in sufficient quantity to make it appear moist. Theoretically one such application of pollen should suffice, but his practice was to make several applications, at intervals, in order to ensure success. Even then the proportion of misses was very high. In cross-fertilisation of plants it was usually necessary to protect the emasculated flowers from the visitation of bees and other insects which might bring to the unprotected stigma pollen from undesired sources. Such a precaution was apparently unnecessary in the case of the potato. Bees did not visit the flowers of the potato, and a flower from which the anthers had been removed before they had shed their pollen would seldom, if ever, produce a seed berry, unless fertilised by hand. The gathering of pollen, particularly from those varieties which produced but little of it, required patient effort. Frequently he had examined hundreds of flowers, and only succeeded in getting a mere trace of pollen. He found, too, that pollen from such flowers was very largely infertile. The plan usually adopted was to attack the anthers with a needle, and collect the pollen on a slip of grass. He found this plan very wasteful of pollen, which was blown away in a fine cloud with the least breath of moving air. He used wooden pill boxes, coated inside with dead black, the pollen grains being more easily seen on the blackened surface. He had a series of those boxes. Each box had its own camel-hair brush, and was devoted to one particular variety, and never used for another without being first sterilised. The brush was used for dusting the pollen on the stigma. If the flowers of some varieties of potatoes were carefully examined the stamens with their anthers would be found imperfect. They were either bent or contorted, and from such anthers little or no pollen might be expected, and when present it would generally be found to be infertile. Once successful fertilisation had taken place, the ovary at the base of the pistil would begin to swell, and the stem carrying it would thicken and curve downwards. He had never seen that latter occurrence referred to by other experimenters, but it was a sure and early sign of fertilisation. The seed berry expanded very rapidly and gradually turned yellow as it ripened. The number of seeds in a berry varied, and might amount to two or three hundred. When the berry was quite ripe it was picked, the seed extracted and carefully dried and put into a package labelled with its parentage. The seed was sown in boxes in springtime, and the young plants were transplanted into the open ground when an inch or two high. They should be given plenty of room, for they grew rapidly, and in their first season, in this climate, attained the ordinary dimensions of a plant grown from a tuber. The seed from a single berry was capable of producing extremely varied results, comprising tubers of all shapes and colors. From a berry obtained from the crossing of a white round seedling with Pink Eye, he obtained 42 varieties, consisting of 11 white rounds, two rose rounds, one violet round, one purple round, 12 white pebble-shaped, one purple pebble, four white round with pink eye, three rose round with pink eye, one fawn round with pink eye, three purple pebble with dark eye, one fawn pebble with pink eye, and one white pebble with pink eye. Many of the seedlings so produced gave remarkable results quite early in their career. Indeed, the first crop from some of them gave quite a fair number of marketable potatoes. Now with regard to the actual experimental work; the 1911 crossings were typical of the work done. His object was the production of new varieties of marketable value, whose qualities should comprise productiveness, a good appearance, a good habit, freedom from disease, and good table quality. By good habit he meant not only a good habit of growth of the haulm, but good habit in the production of tubers close to the stem of the plant. With many market growers productiveness covered a multitude of sins, but he was ambitious to produce potatoes of all-round good quality. In 1911 he made 30 separate successful crosses, using many varieties well and favorably known, such as Brown River, Pink Eye, Snowflake, Bismarck, Fluke-kidney, Queen of the Veldt, and others. In combination with those he used other varieties not so well known. In 1909 Irish blight appeared. He was fortunate enough to have two varieties of potatoes which appeared to be strongly resistant to the disease. Concerning one of them, a good deal of discussion arose abroad. In 1901 a potato grower in Vienna, named Labergerie, stated that a plant of the wild potato *Solanum Commersonii*, of white type, had given rise to a new variety by sporting or bud variation. He named the alleged new-comer *Solanum Commersonii Violet*, and it was under that name that he had imported it. A good deal of controversy arose concerning that potato, and after careful and systematic trial it was proved to be identical with a well-known Continental variety called Paulsen's Blue Giant. That potato had proved, in his experiments, a marvel in that it had never shown the slightest sign of Irish blight in its tubers, and only in one specimen had he ever seen blight in its haulm, and that was a very slight attack. He had grown that potato throughout his grounds in rows alternately with varieties which had been blackened out of existence by the blight, yet the rows of Blue Giant stood unharmed. Another variety he had used was an unnamed seedling which came from Ireland, and which, although not immune to the disease, had proved very resistant to it, and in addition was a very prolific pollen producer, and a potato of excellent quality. In selecting parents for a cross consideration had to be paid to the qualities which it was desired to reproduce. For example, a cross of the Blue Giant and the Pink Eye had inherited the disease-resisting qualities of Blue Giant and the productiveness of Pink Eye. Its color was intermediate, and it had unfortunately reproduced to some extent the deep eyes of the Pink Eye. That seedling was very similar to an old variety, Plunkett's Seedling. From the crosses made in 1910 and 1911, he raised some thousands of seedlings, which year by year had been selected out, until they were now represented by 89 varieties, and that number would no doubt be again reduced during the coming season. The influence of the blight-resisting qualities of Blue Giant upon many of the varieties now in hand had been most marked. Many of the seedlings had never shown the slightest sign of blight, and whilst he would not dare to say that they were immune, he could at least claim for them very great resistance. That resistance to such a disease as Irish blight could not be determined in every season, because the disease required certain climatic conditions for its development. In those seasons when it had been prevalent, it had not been uncommon to find in a row of seedlings a variety quite unaffected, whilst varieties on either side of it had been badly affected. Resistance to disease was a transmissible quality. Bismarck had proved very susceptible to blight, and a very large proportion of seedlings raised from that variety proved equally susceptible. Resistance appeared to be a very variable quality. A seedling which, in its early years was resistant, appeared to lose its power of resistance as it grows older.

BLACKHEATH, February 3rd.—A paper dealing with rabbit destruction was read by Mr. F. Pym. In the discussion which ensued the opinion was general that the best method of exterminating rabbits was by trapping. The meeting was also favorable to the appointment locally of rabbit inspectors, instead of officers appointed by the Government.

CHERRY GARDENS, February 6th.—A newspaper extract on the conservation of water for stock was read and discussed. The value of constructing dams long, narrow, and deep, instead of broad and shallow, was pointed out, the heavy loss by evaporation being thus minimised. Mr Henry Jacobs pointed out that when a dam or waterhole became nearly empty the water became impure and dirty, and the stock lost condition.

LONGWOOD, February 3rd.—The meeting was held at the homestead of Mr. R. A. Lewis, and an inspection was made of the orchard, which was in splendid condition, having been sprayed with a combination of Bordeaux mixture and arsenate of lead. The plums were very fine, including the Satsuma, a variety almost new in the district, an excellent producer, which sold readily. Shipper and October Purple were also showing well. A row of 12 Kiefer hybrid pears attracted attention. Two of them were growing quite straight and ridged and the foliage was deep green, but they were not bearing very well. The other 10 were growing like willows, but were bearing heavily. Mr. Lewis explained that two years ago he had pruned the two, and last year they were clean and their fruit free from disease, but the 10 carried diseased fruit. Now, however, they were all clean, but there was a marked difference in the color of the leaf and the growth. Members considered that the quality and weight of fruit would be with the trees which were pruned. Mr. Beaumont's paper, "Orchard and Orchard Work," which was published in the February number of the *Agricultural Journal*, was read and discussed. It was mentioned that of two orchardists whose properties adjoined, one laid out his ground thoroughly, on the lines recommended in Mr. Beaumont's paper, but the other just prepared the land only fairly. The latter now had to go out to work to maintain his home, whilst the former netted a good income and was extending his area. There was a consensus of opinion in favor of drains, many declaring their preference for stone, if available. Mr. Roebuck said that he had tried various methods of drainage, but in sandy soil he strongly favored long timber on each side of the cutting, with stone across. Mr. J. R. Coles said that he had deep drains cut well into the clay, with large stones laid in an orderly manner along the sides of the trench, leaving a hollow on the bottom, then stones decreasing in size, brush on top of the stones, and then soil.

STRATHALBYN, February 6th.—Mr. R. H. Haines read a paper on pigsties, and Mr. J. Saunders one on pig raising. At the conclusion there was some discussion and a number of questions were asked.

## SOUTH-EAST DISTRICT.

### KONGORONG.

February 6th.—Present: eight members and three visitors.

GROWING GREENFEED.—In a paper on greenfeed growing in Kongorong, Mr. C. G. Wilkey advocated sowing rape and oats as soon as the early rains came. He had tried it for two or three years, and found it profitable. He turned in sheep to eat it off. He preferred oats to barley, because it stood feeding off better. Rape was one of the best fattening crops for sheep. Mr. S. Dixon agreed with the suggestion, which was declared one of the best things for Kongorong. Mr. W. A. Aslin had sown oats last year, and fed 125 sheep on a few acres. Rape sheltered the oats; stock ate the rape first and then the oats. The rape came again. Mr. C. Kemp had successfully tried sowing oats on the stubble. In Mr. C. S. McLean's experience oats stood more feeding than barley. Last year he had sown rape, and this year wheat, with the result that he could not strip the wheat for the rape. He was averse to sowing rape where a wheat crop was to be taken the same year. In reply to questions, Mr. Wilkey recommended Broad Essex as the best variety of rape. About 3lbs. of seed should be sown and 1cwt. of super. to the acre.

### NARACOORTE (Average annual rainfall, 22.60in.).

February 10th.—Present: 27 members.

BEST SHEEP FOR THE SOUTH-EAST.—After dealing with the history of the introduction of sheep into Australia, and the development of the industry, Mr. W. E. Rogers, in a paper on the best sheep for the South-East, said that owing to the recent development of the country in the South-East through the drainage of a large area of swampy land, and the subdivision of many of the larger estates into smaller holdings, it would soon become necessary for landholders to devote their attention more to mixed farming, and particularly, where it could be done, to the growing of fodder crops for fattening purposes. The class of sheep, then, that would be the most profitable for farmers to breed was, in his opinion, the crossbred. There were three crosses particularly adapted to the conditions prevailing in the South-East, viz., Lincoln-Merino, Romney Marsh-Merino, and Leicester-Merino. Either of those crosses produced a sheep that would cut a splendid quality of wool, and if required for fattening purposes, there was ample room to put on the weight. In cross breeding great care should be exercised, otherwise an improvement would be made on the one side to the detriment of the other, more especially when getting away from the first cross. The Lincoln-Merino cross had been for many years in the lower South-East, and some very fine flocks were to be seen in the district. The Lincoln breed had been introduced into the South-East by the late Dr. Brown, of Moorak, Mount Gambier, from whose flock many of the Lincoln studs of Victoria were founded. There were still a number of breeders in the Mount Gambier and Millicent districts whose sheep would compare favorably with any in the Commonwealth. The Lincolns were said to be the largest sheep known, and were favored with a hardy constitution, which was proved by the fact that they were to be found in nearly every country in the world. The wool of the first cross of the Lincoln-Merino commanded high prices, both in the home and foreign markets, while the carcass for freezing purposes was much sought after, both as lamb and mutton. The one objection to that breed was that they possessed a very strong desire to live with the "other fellow" on the opposite side of the fence. The Romney Marsh-Merino cross was not so numerous in that district as the one just referred to, but they were rapidly coming into favor, and would in a very few years occupy a foremost place in the flocks of the South-East. The Romney Marsh breed had been introduced into the district some years ago by the Messrs. Feuerheerdt Brothers, of Crower, near Lucindale, who had founded a stud which had attracted much attention from breeders, not only in the Commonwealth, but also from the other side of the world. Mr. George Riddoch, of Koorine, Kalangadoo, was also turning his attention to that breed, and had some splendid animals on his property, as also had Mr. A. B. Feuerheerdt, of Tarloop, Naracoorte, who, like his brothers, thought very highly of them as wool and mutton producers. Those sheep were natives of the south-eastern part of England, especially the drained marsh districts of Kent, where they had been bred from very early times. They had the reputation of being hardier than the Lincolns, and differed from all the long-wool breeds in being closer coated. The distinguishing feature was a long white head, with a peculiar tuft of wool on a broad forehead. Their especial merit was that they were immune to foot rot, and therefore should be the right type of sheep for the wet country of the South-East, as in some parts of the district that disease had given considerable trouble to the sheep farmers. The Leicester-Merino cross was almost unknown in that district, but nevertheless those to be seen at the Kybybolite Experimental Farm had much to recommend them, and the type would yet take a prominent place with the crossbred flocks of that part of the State. The Leicester breed had one characteristic, and an important one, too, that should make them especially suitable to mate with Merino ewes, and that was their fineness of bone and exceedingly small head, which would result in a higher percentage of lambs being obtained than with either of the long wool breeds mentioned. The ewes of the breeds he had mentioned were said to be splendid mothers, which was a matter of importance when the rearing of lambs for freezing purposes was contemplated. It was impossible for him to produce the sheep of each class named, but he had done the next best thing by bringing a few samples of their wool, which would speak for themselves. An old Swedish proverb said:—''Sheep have golden feet, and wherever the print of them appears the soil is turned to gold.'' That saying was particularly applicable to Australia.—Mr. A. B. Feuerheerdt said that he was a strong advocate of the crossbred for the country west and east of Naracoorte. The Romney Marsh cross was very suitable for the wet lands, because they were not subject to foot rot, which gave much trouble in the South-East in the case of Merinos and other breeds. In crossbreeding it was a mistake to breed from a clean wool ram with a crossbred ewe. It would be better to cross the ewe with an open-woolled ram, after the style of the northern sheep. He might mention that the Romney Marsh thrived well on the coast land of Queensland, where the Merino did not thrive. Mr. Caldwell said they could not shut their eyes to the fact that Merino sheep were still the sheep most forward in the South-East, and he should take it from that that the Merino was the best suited for the greater portion of the district, which did not produce strong feed, and therefore he thought that the Merino was best adapted for it generally. The question, after all, was what paid the best on the average of the country. He recognised that Mr. Rogers advocated the cross principally for breeding lambs for export; but that industry required very rich country, or else the raising of fodder for the sheep, and in that the question of whether it would pay entered. With the exception of some choice portions of the South-East lambraising was still in the future, and so far the Merino, generally speaking, had proved the best sheep for the South-East. Mr. Feuerheerdt said the Merino would never be eliminated from the South-East, and it was highly necessary for cross breeding; but there were certain kinds of land, and a considerable extent of it in the South-East, which was better suited for the cross. They could work the different crosses with the Merino. He might mention, as an instance of the importance of salt to sheep, that at one time Spain decided that no salt should leave the country, and one ton of salt was allowed for every 1,000 sheep. In reply to questions, Mr. Feuerheerdt said that the tendency of the Romney Marsh cross was to eliminate foot rot. The Romney Marsh was healthy at birth, and was early maturing. Mr. S. H. Shinckel said that he had found crosses a great deal of trouble, and liked sheep he could keep in his paddock. He agreed that a great deal of the South-East country was better adapted for the Merino, and there was other country adapted for the crossbred and lamb-raising. He believed the crossbreds in time would become more numerous, but they would never dispense with the Merinos in that district.

NARACOORTE, December 9th.—The Director of Agriculture (Professor A. J. Perkins) attended the meeting by invitation, and was accorded a hearty welcome by the Chairman. After replying to a number of questions which were submitted, Professor Perkins, in acknowledging a vote of thanks, said that he recognised there was much work to be done in the district, and he would visit it as often as he could in order to familiarise himself with the conditions.

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CLARENCE GOODE,

*Minister of Agriculture.*

# POINTS FOR PRODUCERS.

**Agricultural Bureau Conference.**

Arrangements are now being made for the third annual Conference of Branches of the Agricultural Bureau situated on the River Murray. The gathering will be held this year at Waikerie, and the time fixed on is the third week in May.

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**Farmers and the Soldiers' Funds.**

Unanimous support was given by the representatives of 145 Branches of the Agricultural Bureau to the 1916 Congress resolution that every Agricultural Bureau member should set aside a definite acreage of the then coming harvest, the proceeds to be devoted to the South Australian Soldiers' Fund.

Donations are now coming to hand, and if the resolution receives the practical support which the nature of its reception at the Congress augured, the resources of the Wounded Soldiers' Fund should be materially augmented.

**The Breeding Sow.**

The symptoms of heat in the sow are—There is redness and swelling behind, and the animal rides the others. She remains on heat for three days, and at first a slimy discharge may be noticed. If she does not hold to service she will come on in 21 days again, the three weeks being the period between heats. A sow that has farrowed comes on a week after weaning, as a rule. Boars should not run with sows, but be kept separate to avoid accidents and exhaustion from too frequent matings. One complete service is most effective. From seven to nine months old is the usual time to begin breeding.—FRAS. EVELYN PLACE.

**Feed for Chicks.**

The mixture used for the feeding of chickens at the Parafield Poultry Farm by the Poultry Expert (Mr. D. F. Laurie) is made up of two parts wheat, one part hulled oats, one part barley cracked to quarter size. To this is added some granulated charcoal and shellgrit.

In the same proportion, but ground fine, the same cereals are used for dry mash fed in hoppers. To the dry mash an addition of 5 per cent. of meat meal is added.

**Women and Agriculture.**

The recommendation of the Advisory Board of Agriculture that provision should be made for the inauguration of Women's Branches of the Agricultural Bureau will be read with considerable interest. If given effect to, the scheme should mark a new era in the Agricultural Bureau, and its importance to the womenfolk living in the State agricultural areas should be of no less moment.

The extension of the Agricultural Bureau system in this direction would seem to be a natural development of an institution designed with the object of promoting agricultural education, more especially so at a time when stress of economic conditions has thrown an increased burden of agricultural work on to the women members of the farm household.

# INQUIRY DEPARTMENT.

Any questions relating to methods of agriculture, horticulture, viticulture, dairying, &c., diseases of stock and poultry, insect and fungoid pests, the export of produce, and similar subjects, will be referred to the Government experts, and replies will be published in these pages for the benefit of producers generally. The name and address of the inquirer must accompany each question. Inquiries received from the question-boxes established by Branches of the Agricultural Bureau will be similarly dealt with. All correspondence should be addressed to "The Editor, *The Journal of Agriculture*, Adelaide."

## VETERINARY INQUIRIES.

[Replies supplied by Mr. F. E. Place, B.V.Sc., M.R.C.V.S., Veterinary Lecturer.]

[Extraordinary pressure on space has rendered it necessary to very considerably curtail the inquiry department. Replies to those questions of more general interest only have been published; however, every query received has been replied to through the post.—Ed.]

"A. Mc.," Tantanoola, asks for treatment for warts on teats of cows.

Reply—If big enough, snip off with scissors and touch with caustic (silver nitrate). If small, rub one day with vinegar and next with castor oil; keep on till warts disappear.

"C. C.," Tantanoola, asks for information regarding bots.

Reply—The bot fly has no sting, therefore cannot sting. Horses are frightened because they recognise a troublesome visitor. Kerosine and castor oil smeared on chin will keep them off.

"A. J. W.," Carrawilla, has a cow which is blind at night.

Reply—There is little doubt but that the yacca is at the bottom of the mischief. Give her a tablespoon of the following powder night and morning in feed, and report progress in a month—¼lb. each sulphate of iron, sulphur, nux vomica, gentian, 1lb. each sugar and linseed meal.

"C. M.," Uraidla, has a cow with hard lumps on one side of the udder and loss of milk.

Reply—It would appear as if there had been a cold caught on the affected side, and it would be a good plan to give morning and evening for a week 20 drops tr. phytolacca, also to well foment the affected quarters twice daily with hot soapsuds containing a few drops of the same tr.

"G. F. B.," Hammond, has bay mare, 5 years, rapidly falling off in condition, lampas unusually prominent, very small mouth, appetite very poor; formerly over-gorged with wheat, and hoof sloughing off.

Reply—The animal certainly will not pay for treatment; the main trouble is with the teeth, owing to the narrowness of the mouth; the appearance of lampas is due to the same cause. A new, but defective, hoof will grow in the course of months. Instead of drugging, turn her out for 12 months in good feed, with access to a creek; she may come up useful after, but it is doubtful.

"L. W. H." (no address given) has cow with perforation of teat.

Reply—Touch with red-hot wire. Cover with adhesive plaster and collodion. See former *Journals*.

"J. G.," Springbank, *via* Port Pirie, has a draught gelding, 9 years, badly cut on fetlock by barbed wire.

Reply—As the wound has nearly healed it will be well to let it do so, and a month later to blister with ½oz. of blister made of 1 dram biniodide of mercury and 7 drams lard. But there is every probability that the bone has been injured, and that the swelling will remain. If a month after blistering there is a lessening of the swelling, then write again, and perhaps something more may be done.

"H. G. L.," Mypolonga, has a yearling filly in good condition which has broken out on belly with hard lumps.

Reply—There are two possibilities—(1) That it is a case of nettlerash or hives, which a dessertspoon of sulphur in feed twice daily for a week will cure; (2) worm tumors caused by flies. If the former treatment does not succeed, this will be the case, and may yield to a dessertspoon of Fowler's solution of arsenic in feed twice a day for a week.

"A. J. P.," Hectorville, has a mare, 8 years, which, after foaling, swelled under belly and breast.

Reply—The swellings were probably caused by parasites, and it is probable that under treatment she will improve. Give a tablespoon of Fowler's solution of arsenic in feed twice a day for three weeks. If she is paddocked she will probably come in for a handful or two or bran, in which the medicine may be mixed. Bathing the swellings with cold water and vinegar in equal proportions may also assist. Kindly report progress at end of three weeks.

"C. M. W.," Netherton, has a mare, 3½ years, which, in good condition, went to siding with load of wheat, fed on soaked wheat and cocky chaff, fed between 11 and 12 at night. Found missing in morning; when discovered was blown up like football; driven a mile and a half to yard, and given bicarbonate of soda; died in a few minutes.

Reply—The condition was flatulent distension of the stomach, caused possibly by eating ravenously when tired; the treatment some hours earlier would have done good, but probably the heart's action was interfered with when she was found. It is better to give a bucket of water and a handful of pollard in it and then a little long hay after a long day's work.

"G. L. H.," Koonunga, had pigs which died after castration.

Reply—As suspected, bloodpoisoning was the cause of the symptoms and deaths; although the pig is very tolerant of dirt, still care must be taken to use a clean knife, and a dressing of kerosine or verdigris ointment after operation is desirable. Should such an accident happen again, reopen the wounds and syringe out with a solution of ¼oz. boric acid and ¼oz. chlorinated lime to 1 quart water. It would be better to bury pigs dying in this way, but if well boiled they probably would not hurt fowls.

## HORTICULTURAL INQUIRIES.

Replies supplied by the Horticultural Instructor (Mr. GEO. QUINN).

### ELEPHANT BEETLES.

The Berri Branch of the Agricultural Bureau forwarded specimens of beetles found on plum trees, which they had denuded of a number of young shoots. The beetles are not the same as those called curculio, although they belong to the same family. Those sent are known as elephant beetles (*Orthorrhinus cylindirostris*). They puncture the shoots or limbs and deposit an egg in each minute tunnel. The resulting grubs burrow the limbs and pupate in the tunnels. The perfect beetles emerge from the enlarged tunnels in spring and summer to repeat the cycle of egglaying, &c. As they are natives, and live in all sorts of growing wood, everything in the shape of prunings should be removed and promptly burnt. Tamarisk trees are favorite hosts for this pest. Plantations, or parts of them affected, should be sprayed with lead arensate, say 1lb. in 10galls. to 15galls., or dusted with paris green and quicklime, 1oz. to the pound, in the spring or early summer.

### A BORING INSECT.

"G. F. G.," East Adelaide.—From the description given of the boring insect attacking your apricot trees I am inclined to consider it is identical with the common stone fruit tree boring caterpillar found on the plains of Adelaide. These caterpillars arise from the eggs laid by a moth known as ***Maroga gigantella***. The presence of the borer is first indicated by patches of sawdust-like borings adhering to the limbs, frequently in the forks or on spots where gum exudes. When these are scraped away whilst still fresh, the small caterpillars are found beneath, not having penetrated the hard fibre of the wood; but later on, if not molested, they tunnel into the heartwood. The best means of prevention known consists of carefully attending, at each winter pruning, to any sawdust indications, and destroying the caterpillars before they penetrate deeply. Should they have burrowed out of sight, a thin wire thrust into the hole will often destroy them. If not vulnerable in this way, the caterpillar can be suffocated by using a little bisulphide of carbon liquid, saturating a piece of cotton wool or wadding the size of a pea with it, and inserting this wad into the hole, which is plugged immediately airtight with clay. The fumes fill the tunnel, and suffocate the pest. This chemical is very inflammable, and must not be used near a naked light, match, &c.; it must also be kept tightly corked. It costs about 1s. per lb. from wholesale druggists.

## AGRICULTURAL INQUIRY.

Reply supplied by the Superintendent of Experiments (Mr. W. J. SPAFFORD).

"H. B. W.," Victor Harbor.—(1) If by artificial manure, superphosphate is meant, there is no danger of it being washed out of reach of the roots of the ordinary annual crops. There are many constituents in the soil that very readily combine with phosphoric acid, making substances not soluble in water, and so phosphoric acid does not move once it is put in the soil, but both nitrogen and lime are washed out of it very quickly. (2) It is generally recognised that, where the watertable is not too near the surface, the main roots of the wheat plants penetrate from 4ft. to 5ft., but they have been found to reach 7ft. from the surface.

## MANGOLDS AS PIG FEED.

Upon many points regarding mangolds and pigs, breeders differ, but they are all agreed upon the following:—(1) Mangolds are very injurious to in-pig sows, often causing them to slip. (2) Fresh mangolds fed to pigs cause acute indigestion, which is not the case when they are stored. (3) The feeding value of mangolds is very small from a fattener's point of view. (4) Boiled with other feed they are more satisfactory. (5) As they are tasty, pigs will over-eat when they have the chance, with acute indigestion resulting. (6) Like all succulent feed, fed in moderation they are good; in excess, harmful. (7) The cause of death on account of pigs eating them uncooked is in most cases acute indigestion. (8) Treatment would be baking soda and ginger, a teaspoon or so of each.—FRAS. EVELYN PLACE, B.V.Sc., M.R.C.V.S.

# EYRE'S PENINSULA.

## ITS AGRICULTURAL DEVELOPMENT AND THE WORK OF THE DEPARTMENT OF AGRICULTURE.

At the recent Conference of Upper Eyre's Peninsula Branches of the Agricultural Bureau, held at Cowell on February 27th, the Director of Agriculture (Professor Arthur J. Perkins) instead of delivering a set address, as is usual on such occasions, dealt with the work on Eyre's Peninsula of the Department of Agriculture, both from the point of view of what had been done, and the policy of the Department in relation to the West Coast.

Professor Perkins said—Eyre's Peninsula generally is apt to look upon itself as isolated, and not in touch with the Department of Agriculture. Whilst its geographical position does separate it to a certain extent from the Department, I hope you will admit we are going through rather difficult times in many ways. The war has given rise to a good deal of new work which the Department has to undertake, and which prevents us from doing as much as we would like to do in outlying districts of the State. But we have made a start in various directions, in so far as this area of country is concerned, and I hope that gradually we shall learn more about the country and be in a position to help more than we have been able to in the past.

I am inclined to look upon Eyre's Peninsula as a newly-settled part of the State, and although portion of the country has been settled for many years, I still feel that mere length of years does not necessarily imply definite settlement in so far as the land is concerned. The country may have been occupied, but from what I have been able to see it can hardly be called settled country. I have a very vivid recollection of being shown a farm which I was told had been settled for 30 years on the fallows of which the mallee shoots were still growing. I am afraid that it cannot be seriously disputed that you are really in the early settlement stages, in so far as the great bulk of the country is concerned, and unquestionably, the sooner you are able to get out of this position the better for yourselves and the State as a whole.

### THE EYRE'S PENINSULA FARM.

You will recollect that three years ago the Government asked me to pick out some central area on Eyre's Peninsula that could be used as a Government farm. You will also recollect that there was hardly a hundred in the Peninsula that did not want the farm. In making the selection of the site I took four points to guide me. The first was, considering the extent of the Peninsula, we needed a central position, accessible to the general public by being close to a port or railway station. Secondly, whatever might be thought to the contrary, I felt that it should not be placed in a locality which would not prove a good advertisement for the Peninsula. It would have been a serious mistake to have established the farm in a locality in which results would have been uniformly unsatisfactory. A Government farm is visited by far more people than an individual farm, and if, for example we had placed it in a locality in which results were unsatisfactory, the outside public might have inferred that the balance of the Peninsula was no better. We required a good piece of land for that particular reason. I want to feel that I can take people on this farm and show them what can be done on certain parts of Eyre's Peninsula. Thirdly, I looked for an adequate water supply, and fourthly a sufficiency of fencing material. These were the different points that guided me, and I finally fixed on Minnipa.

I should like very much that the people of Eyre's Peninsula should look on the Minnipa Farm as their particular farm, however differently they may happen to be situated. Of course it does not follow that other farms will not be established in the future; indeed, I hope that in the course of time we shall be able to do far more for you than has hitherto been the case.

## FARMERS' PLOTS.

Whilst in present circumstances I cannot very well hold out the hope that an experimental farm may be started in this neighborhood, there is something that can be done which will involve the State in far less expenditure, and at the same time meet some of your difficulties. In the hundred of Butler last year we started farm plots on farmers' land, and possibly something similar might be done here.

There is no reason, excepting the size of the Departmental staff, that something of the sort should not be done in this district. It is worse than wasting money, however, to attempt to set out plots which cannot be efficiently supervised. The work involves a staff of a certain size, and we cannot undertake to take up a large number of additional plots in a single year.

## MINNIPA FARM.

Some of the results that we have secured on the Minnipa Farm in 1915-16-17 are given in the accompanying tables. You will see that in the first year of the handling of this farm the whole of the crop sown, 148 acres, was cut for hay. This point brings up a matter which to me seems of importance, that is, the complete clearing of the land.

What I want you to realise is that in this our first year, we were able to put the binder on the total area that had been cleared.

In many parts of the Peninsula roots and stumps, it is said, are not detrimental to cropping; they are even claimed as an advantage. Personally, however, I have always held that the only reason we cultivate land in the way we do in the mallee is lack of capital. If a settler has the necessary capital I feel confident that it will pay him better to clear the land thoroughly from the outset, and I am endeavoring to demonstrate that that is so. I even hope that in a not very distant time we shall be able to do without the stump-jump implements. Later on I shall be able to submit definite data as to the cost of clearing on the Eyre's Peninsula Farm.

The country at Minnipa is not country that can be rolled in the ordinary way. The mallee is exceedingly large, and some of the neighbors who were putting crops there have simply chopped the trees to a height of about 2ft., and were growing crops around them. Probably these men have not the means of doing anything else.

### TAKEALL.

The question of takeall has been raised. Something like 25 years ago this question was a very live one throughout Yorke Peninsula, which was then in comparatively early stages of settlement. Similarly as soon as the settlement of the Murray mallee and the Pinnaroo district began, we had the same question cropping up, and again in Eyre's Peninsula on the lighter mallee lands. It appears to me that takeall is the unavoidable consequence of our usual methods of reclaiming the mallee. Where the land is rolled, cropped, burned, cropped again, burned, cropped again, and so on, in the end you get a condition of things which appear to be favorable to the development of takeall. I feel certain, however, that as you emerge from the pioneering stage this disease will gradually disappear in the same way as it has practically disappeared on Yorke Peninsula. I have worked for years on mallee country, and to my knowledge we have never had any trouble with takeall on any extensive scale. On the other hand, we have to face this fact, that farmers are accustomed to call "takeall" anything affecting their wheat crop for which they cannot account. This leads to a good deal of confusion. There is one type of takeall, however, that is very distinct. This is a fungus disease which grows up on the wheat plant, attacks the roots, and appears just about the bottom internode where the straw joins on to the root system. This may form a bare patch which extends from week to week if conditions are favorable, forming in the end a more or less circular patch. This dying-back of the wheat plants may continue up to harvest time, ending in white heads on the edge of the crop. One particular condition that appears to favor the disease is a certain openness and looseness of the soil that you get when you endeavor to grow crops year after year, so that it would seem that takeall is far more prevalent among crops sown successively in newly-reclaimed land than in cases where the land is fallowed, and worked down properly. There are times when you cannot do justice to your fallows, with the result that takeall develops. Light land should never be ploughed dry, and should certainly be broken up as early as possible in the winter months; the more rain that falls on it the less is the danger of disease.

### OATS.

The question of oats as a remedy against takeall has been suggested, and without a doubt oats are useful, since they are more or less immune to the disease, and represent variety in cropping. The question of the liability of oats to takeall is apparently a debateable one; but, in any case, it is only slight. If a crop badly affected with takeall were followed with a crop of oats, followed by a year's grazing, it would do much towards clearing the land of takeall; it is essential, however, in the years that follow, that the land be maintained clean and free from weeds harboring the takeall fungus.

### EYRE'S PENINSULA FARM.

In regard to the present season at Eyre's Peninsula, you will notice from the accompanying table that the rainfall has been very satisfactory; of the 18in. that fell 16½ were spread over the period extending from April to November. The area cropped was nearly 223 acres, consisting of new land fallowed in the previous year, 38.752 acres; new land, burnt in the autumn, 36.089 acres; and stubble crop land 148 acres. The newly cleaned land was represented therefore by about 75 acres. The wheat on fallow, stubble, and new land, yielded about 28½bush. This is a satisfactory result. The hay went approximately four tons. Like every other portion of the State, we had a great deal of harvesting difficulties, and in one field we lost about two bags to the acre.

#### EYRE'S PENINSULA EXPERIMENTAL FARM.—1915-16.

| | |
|---|---|
| Total 1915 rainfall | 13.88in. |
| April-November rainfall | 12.59in. |

New land completely cleared, burnt and ploughed, February to April, 1915, 148 acres.

*Seeding.*

| | Acres. | Super. per acre. | Date sown. |
|---|---|---|---|
| Algerian Oats | 48 | 113lbs. | May 5-8 |
| Silver King | 37 | 90lbs. | May 19-22 |
| King's Red | 35 | 96lbs. | June 15-17 |
| Gluyas | 14 | 120lbs. | June 18-19 |
| Eclipse | 14 | 120lbs. | June 19-21 |
| | 148 | | |

### *Harvest Results.*

In view of probable chaff requirements of new settlers the whole of the crop was cut for hay, and averaged 1 ton 17cwts. 94lbs. per acre.

## EYRE'S PENINSULA EXPERIMENTAL FARM.—1916-17.

| | |
|---|---|
| Total 1916 rainfall | 18.02in. |
| April-November rainfall | 16.62in. |

### *Land Cropped.*

| | |
|---|---|
| New land fallowed | 38.752 acres |
| New land burnt in autumn | 36.089 acres |
| Stubble crop | 148.000 acres |
| | 222.841 acres |

| | | |
|---|---|---|
| Oats (stubble and new land) | 49.902 acres | 39bush. 33lbs. per acre |
| Wheat (fallow, stubble, and new land) | 171.726 acres | 28bush. 35lbs. per acre |
| Hay | 1.213 acres | 4 tons approximately |
| | 222.841 acres | |

## EYRE'S PENINSULA EXPERIMENTAL FARM.—1916-17.

### *Wheat Yields.*

| Variety. | Area. | Condition of Land. | Yield per acre. | |
|---|---|---|---|---|
| | Acres. | | Bush. | lbs. |
| Caliph | 11.869 | New land fallowed in 1915 | 35 | 59 |
| King's Red | 14.125 | " " " | 35 | 4 |
| Queen Fan | 3.338 | " " " | 34 | 31 |
| College Eclipse | 9.420 | " " " | 33 | 17 |
| Means | 38.752 | " " " | 34 | 52 |
| Eclipse | 35.781 | 1915 stubbles | 29 | 37 |
| King's Red | 20.530 | " | 28 | 25 |
| College Eclipse | 0.750 | " | 28 | 11 |
| Baroota Wonder | 37.980 | " | 27 | 36 |
| Queen Fan | 0.285 | " | 26 | 1 |
| Gluyas | 12.371 | " | 17 | 37 |
| Means | 107.697 | " | 27 | 17 |
| Gluyas | 25.277 | New land burnt in autumn | 24 | 41 |

With the exception of Gluyas on new land, which was divided into manure plots, all the varieties were dressed with 1cwt. of super. to the acre.

## EYRE'S PENINSULA EXPERIMENTAL FARM.—1916-17.

### *Manure Plots.*

New land cleared and burnt in autumn of 1916, ploughed up and sown to Gluyas wheat.

| Manure Dressing. | Area. | Yield per acre. | |
|---|---|---|---|
| | | Bush. | lbs. |
| 2cwts. super. | 4.418 acres | 28 | 35 |
| 1cwt. super. | 4.046 acres | 24 | 11 |
| ½cwt. super. | 3.539 acres | 22 | 55 |
| No manure | 3.598 acres | 19 | 56 |
| Headlands. | | | |
| 1cwt. super. | 9.676 acres | 25 | 33 |

This crop was very badly lodged, and, in the manager's estimate, fully two bags to the acre were lost, particularly in the heavily-manured plots.

I should like to say about this farm that we shall have a fair area under crop in the coming season, and I shall be able to leave a fair area of the cleared land out for fallowing. I propose establishing an orchard, and endeavoring to make the surroundings attractive to visitors. We shall have good typical livestock, and I hope that we shall see there as often as possible, farmers who have the opportunity of moving about. I shall endeavor to persuade the Government to give special inducements to them in the way of occasional free passes on the trains. It is my ambition to see there a Conference of the Eyre's Peninsula Branches of the Agricultural Bureau.

### FARMERS' PLOTS ON EYRE'S PENINSULA.

During the present season we have restricted ourselves to tests of varieties of wheat on one farm, and to manurial tests on the other. In both cases the crops were badly affected with takeall. On Mr. Butler's farm we had six varieties of wheat, all dressed with 1cwt. of super. to the acre, the plots in each case being three acres in area.

On Mr. Jericho's farm the results were better, although there was also trouble with takeall. You should notice that the heavy dressings of super. did not blight the crop on the light land, as it is frequently alleged they do.

FARM PLOTS IN HUNDRED OF BUTLER, 1916-17.

*Varieties of Wheat (Mr. S. L. Butler's Farm).*

| Variety. | Yield per Acre. |
|---|---|
| Yandilla King | 15bush. 23lbs. |
| Gluyas | 12bush. 1lb. |
| King's Red | 10bush. 19lbs. |
| Queen Fan | 8bush. 14lbs. |
| Firbank | 5bush. 34lbs. |
| Marquis | 4bush. 24lbs. |

Three-acre plots, dressed with 1cwt. super. per acre; all badly affected with takeall.

*Manure Plots (Mr. C. F. Jericho's Farm).*

| Manure. | Variety. | Yield per Acre. |
|---|---|---|
| 3cwts. super. | Gluyas | 28bush. 31lbs. |
| 2cwts. super. | Gluyas | 23bush. 32lbs. |
| 1cwt. super. | Gluyas | 16bush. 32lbs. |
| ½cwt. super. | Gluyas | 16bush. 17lbs. |
| No manure | Gluyas | 12bush. 12lbs. |

All plots 2 acres in area, excepting No Manure, which was one acre. Slightly affected with takeall.

1916 rainfall for the locality, 15.60in.

It might be of interest to you to see results from land in the mallee where the conditions are somewhat similar.

## WILKAWATT FARM PLOTS.

(Mr. W. J. Tylor's Farm.)

*Manure Plots,* 1916-17.

| Plot. | Manuring per acre. | Yield per acre. |
|---|---|---|
| 1. | ½cwt. super. | 12bush. 49lbs. |
| 2. | 1cwt. super. | 13bush. 42lbs. |
| 3. | 2cwts. super. | 19bush. 39lbs. |
| 4. | 1cwt. basic slag | 12bush. 32lbs. |
| 5. | No manure | 12bush. 6lbs. |
| 6. | 2cwts. basic slag | 18bush. 56lbs. |
| 7. | 2cwts. super., ½cwt. nitrate of soda (spring) | 22bush. 17lbs. |
| 8. | 2cwts. super., ½cwt. sulph. of potash (seeding) | 21bush. 7lbs. |
| 9. | 2cwts. super., ½cwt. nitrate of soda, ½cwt. sulph. of potash, 5cwts. lime | 21bush. 18lbs. |
| 10. | 5cwts. lime | 14bush. 49lbs. |
| 11. | 5cwts. lime, 2cwts. super. | 18bush. 37lbs. |

One bushel of Baroota Wonder wheat was drilled in to the acre on all of the plots.

*Averages for* 1915 *and* 1916.

| | | Yields per Acre. | | | | Means. | |
|---|---|---|---|---|---|---|---|
| | | 1915. | | 1916. | | 1915-1916. | |
| Plot. | Manure per acre. | Bus. | lbs. | Bus. | lbs. | Bus. | lbs. |
| 1. | ½cwt. super. | 9 | 16 | 12 | 49 | 11 | 2 |
| 2. | 1cwt. super | 15 | 17 | 13 | 42 | 14 | 29 |
| 3. | 2cwts. super | 21 | 8 | 19 | 39 | 20 | 23 |
| 4. | 1cwt. basic slag | 11 | 38 | 12 | 32 | 12 | 5 |
| 5. | No manure | 8 | 43 | 12 | 6 | 10 | 24 |
| 6. | 2cwts. basic slag | 13 | 37 | 18 | 56 | 16 | 16 |

*Averages for* 1914, 1915, *and* 1916.

| | | Yields per acre. | | | | | | Means. | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1914. | | 1915. | | 1916. | | 1914-1916. | |
| Plot. | Manure per acre. | Bus. | lbs. | Bus. | lbs. | Bus. | lbs. | Bus. | lbs. |
| 5. | No manure | 1 | 11 | 8 | 43 | 12 | 6 | 7 | 20 |
| 1. | ½cwt. super. | 3 | 34 | 9 | 16 | 12 | 49 | 8 | 33 |
| 2. | 1cwt. super | 3 | 56 | 15 | 17 | 13 | 42 | 10 | 58 |

From the point of view of the dressing of super., I think that if we can have [illegible] that in certain districts heavy dressings pay better than light ones, no doubt the farmers will in time make use of them. If you clear the land thoroughly, fence it, provide water, and if you can see your way to use heavier dressings of super. the carrying capacity of the land will be so improved that you will be surprised at the quantity of livestock that you can carry. At Roseworthy, when I took charge, in spite of the fact that I did not handfeed very heavily, and that there was very little land out for ordinary grazing, I was able to keep about one sheep to the acre. You may not be able to carry one sheep to the acre on the farms here, but you could easily carry one sheep to the acre on the grazing area, if you farmed the land well. When I say that, I include such grazing crops as you can grow—I am not relying merely on the weed growth of ordinary farm pasture. It is necessary to distinguish between the farm and the station in this direction.

# AGRICULTURAL BUREAU.

## Conference of Lower North Branches—Held at Lyndoch.

The annual Conference of the Lower North Branches of the Agricultural Bureau was held in the Institute, at Lyndoch, on Friday, March 2nd. There was a very large attendance of delegates, and Mr. F. Moore, Chairman of the Lyndoch Branch, presided. Assembled on the platform were Mr. F. Coleman (Chairman of the Advisory Board), Mr. W. J. Colebatch (Principal of the Roseworthy Agricultural College), Mr. F. E. Place (Government Veterinary Expert), Mr. D. F. Laurie (Poultry Expert), Mr. H. E. Laffer (Viticultural Instructor), Sir Richard Butler, M.P., Mr. Hague, M.P., and Mr. H. J. Finnis (Acting Secretary to the Advisory Board).

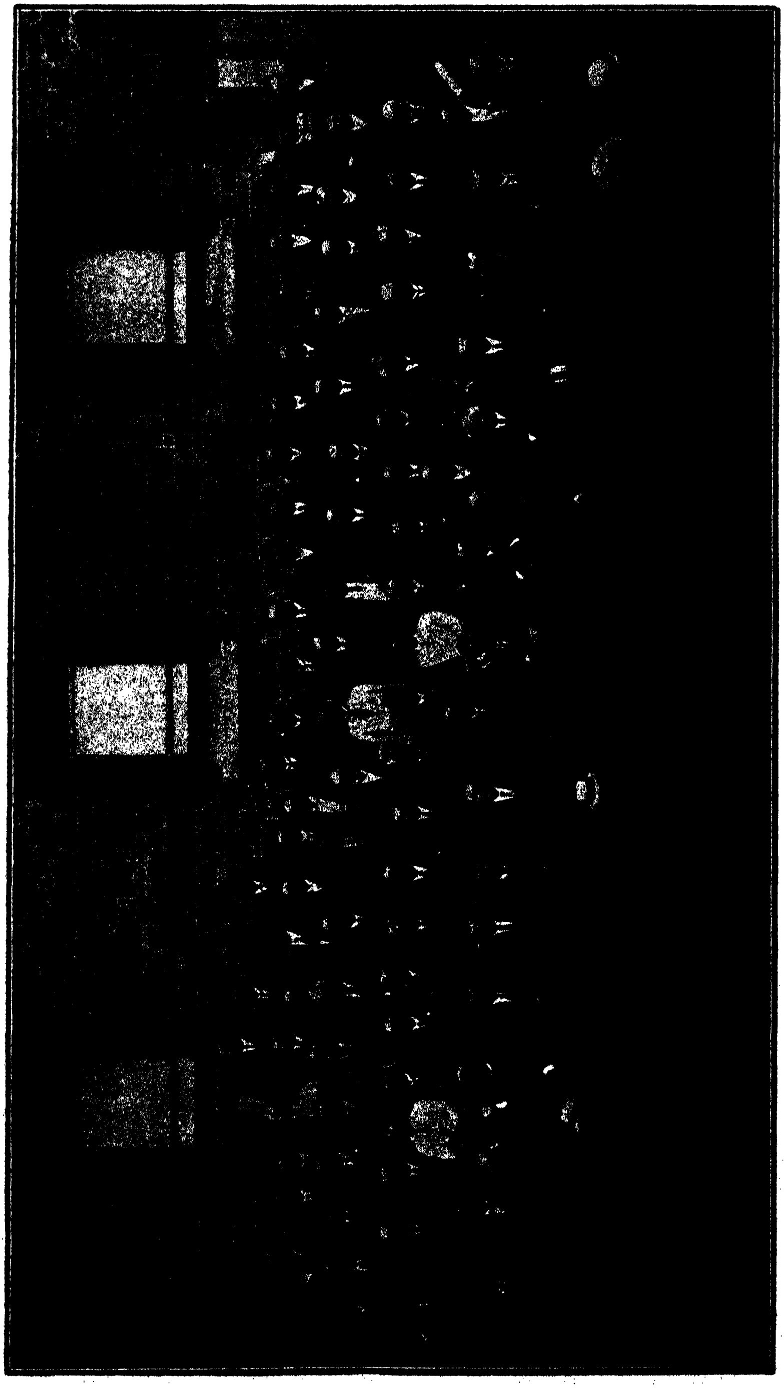
### EXHIBITION OF PRODUCTS.

Arranged around the hall was a very fine collection of the products of the district, comprising specimens of wheat, maize, sorghum, millet, fruit, vegetables, flowers, wool, wine, honey, butter, cheese, &c.

### OPENING CEREMONY.

The National Anthem having been sung, the President called upon Mr. Coleman to open the Conference.

Mr. Coleman said that it was usual, where possible, for the Minister of Agriculture to open the Conference, but Mr. Goode had been called away to Melbourne unexpectedly, and it was not until that morning, when he arrived at Gawler, that he (Mr. Coleman) had been asked to open the Conference, and therefore they should not expect an elaborate speech from him. He was pleased to see the magnificent exhibits in the hall. During the past three years he had been to different parts of the State to attend conferences, but in no place had the splendid display which he then looked upon been surpassed. It was recognised that that was one of the finest districts in the State, and that in the Barossa Hills they had a fine inheritance which was capable of producing in the future far more than in the past. In the past season the grape crop had been very poor, and therefore the display that day was the more creditable to those who had undertaken the arrangement of it, and he congratulated the Branches concerned. The Agricultural Bureau was a live body, and was still growing. They had 190 Branches, with a membership of more than 5,000, and amongst them were some of the most live producers in the State in the different departments of rural production. That district could hold its own with any other district, not only in that State, but in the Commonwealth, and during the next few years they must produce all they possibly could. The British Government was promising 4s. 6d., 5s. 9d., and 6s. 6d. per bushel to encourage production there, so that all would be assured of good returns for their crops for some years to come. For wool the demand would be very great for the next few years, and altogether in a district like that, unlimited in its possibilities, they should produce everything they possibly could in the way of fruit, vegetables,



Some of the Delegates and Officers of the Department of Agriculture who attended the Conference of Lower Northern Branches of the Agricultural Bureau, at Lyndoch.

wine, currants, &c. More could be done than had been done, and he urged them all to take the matter up energetically. During last year eight Agricultural Conferences had been held under the auspices of the Agricultural Bureau in different districts throughout the State, and were well attended, particularly in that district. They had, in that institution, one which had tremendous possibilities. Farmers were not a class who wished to keep their methods secret to themselves, but were willing to give the value of their knowledge and experience to others. Through the Bureau they had the opportunity of discussing their experiences in the cultivation of the soil and the management and control of stock. He hoped therefore that the advantages of the Bureau would be even more availed of than in the past. Rosenthal was one of the most active Branches in that district, and they had made a very great show in the exhibits, particularly in wheat, through the influence of Mr. Stevens. He (Mr. Coleman) was a good deal interested in new varieties of wheat for the district. What suited them in Lyndoch and in the Barossa Hills might not be a variety which would suit other districts. He therefore would encourage the sons of members of the Bureau to take an interest in securing varieties of wheat to suit the district. They should gather the best heads of wheat they could get in the crop and experiment with them, because they would be of the greatest value to the district. Some varieties proved more suitable to some districts than to others, and by experimenting in the way he had indicated they would secure eventually a variety which would give a yield that no other variety could compare with. They knew that certain cows were more suitable to one district than another, according to the supply of feed, and it was the same with wheats. He hoped the Congress which they were opening that day for the first time in that part of the district would be the means of teaching them all something, and they should all resolve to do all they could for the best interests of the State. He had much pleasure in declaring the Conference open. (Applause.)

Mr. H. E. Laffer (Viticultural Instructor) then read a paper on the fungoid diseases of the vine.

(The Conference adjourned for lunch.)

## BLOAT IN COWS.

On the resumption of the proceedings after lunch Mr. F. E. Place (Veterinary Lecturer) delivered an address on bloat in cows. Bloat was caused, he said, by the accumulation of gas in the paunch, and the question was how to remove it. The simplest method was to smear tar on the animal's nose or tongue. The cow would then proceed to lick it off, and that created a comparatively large amount of saliva, which descended into the paunch, and, acting upon the gas, gave it a chance of being eructated. Another method was to dip a bit of thick rope in tar and put it in the animal's mouth, fastening the other end around her horns. It should be left there a few minutes, and relief would probably follow. A stick, a couple of inches in diameter, with or without tar upon it, placed across the mouth, would be effectual. The gas could also be removed by passing a probang, a more or less elastic instrument, 8ft. or 10ft. in length, with a nob at one end and a brass tube at the other. The centre was hollow, and there were appliances for passing purposes. To use the probang it was necessary to confine the cow in the bail, hold her head straight out, and then put the probang so far into her mouth that she could not jump it out. The probang would then be passed into the paunch and the gas would escape. In the absence of a probang the handle of a cart whip, well greased, might be used. Great care should be exercised, however, or the gullet might be injured, especially if the cow jumped forward just as the instrument was passed. A length of 8ft. or 10ft. of indiarubber hose, well greased, and applied as a probang should be applied, would probably prove successful. In the event of nothing of that sort being available opemorphine might be administered, but it was a German drug and almost unobtainable at present. Ordinary baking soda, that was bicarboate of soda, or washing soda, 1oz. to 3oz. in hot water, with a little milk poured down the cow's throat, would probably give relief, or even a handful of ordinary salt passed on to the back of the cow's tongue would do. If a photo. outfit were handy, 3oz. or 4oz. of hypo., dissolved in warm water, given slowly as a drench was also a useful remedy. Ammonia of the household sort, a teaspoonful in warm water, or a teaspoonful or two of carbonate of ammonia mixed in honey or molasses and smeared in the mouth would also give relief. Burning feathers or a little sulphur under the cow's nose might seem curious, but it was sometimes effective. Other means were the use of a trocar and canula. Owing to the formation of the cow's paunch it would be found in bloat that there was very much more swelling on the left side than on the right, so that if the highest point of the swelling were taken when the cow was in a standing position—and it was practically the same when lying down—standing well up to the shoulder the point of the swelling might be pierced with the trocar and canula. The trocar should then be withdrawn, and the canula left in. The gas would then escape. If no trocar could be obtained almost any knife might be used as long as it was sharp. It was better to leave the knife in after making the opening, giving it half a turn to give the gas an opportunity to escape and to prevent food being forced by the gas as the swelling fell away, beneath the skin, and so cause the formation of abscesses.

## DAIRYING.

Mr. R. E. Clements (Gawler) read a paper on dairying as follows:—The man who is establishing a dairy, either for the purpose of milk producing or cream producing, has four things to consider—(1) The best kind of cows to be kept for the line of business he intends to follow; (2) how to feed to procure the best flow and quality of milk; (3) regularity of milking; (4) cleanliness. In regard to the best breed of cows to be kept I do not favor any particular pure breed. One man favors one breed and another favors another. Some will say that the Jersey is the best, another the Ayrshire, another the Shorthorn, and another the Holstein, and so on. In my opinion the crossbred cow is the most suitable cow in most districts, especially on the plain country. Take for instance the pure-bred Jerseys. We find them rich in butter fat, but on the whole not large milk producers. The Ayrshire is to my mind a better class of cow to be kept, as they are better milk-producers and good creamers. The Shorthorn is a good all round breed, and many of them deep milkers, but they are difficult to breed for good dairy cows, because they often go more to beef than milk, but they cross well with the Jersey or Ayrshire. The Holsteins are always recognised to be the biggest milkers, but not so rich in quality, and they require green feed all the time they are in profit. I favor crossing the Jersey cow with the Holstein bull or the Jersey cow with the Shorthorn bull, and cross the progeny with the Ayrshire bull. I have a great weakness for the Ayrshire, only that they are inclined to be short-teated. Some of the best milkers I ever bred and milked were a cross by an Ayrshire bull. Some people tell us that the Jerseys are the best to keep as they do not cost so much to feed as the bigger cows. If the small cow can give as much milk as a big one it will cost just as much to feed her.

*The Feeding.*—The best feed for a cow is the natural green grass, but we cannot get it all the year round, so we have to get a substitute. The next best is good oaten hay and bran. Every dairyman should procure, say from three-quarters to one ton of bran for every cow he intends to milk during the year. Generally speaking there are only three months of the year we can expect to milk profitably from the green grass. A cow should have from 8lbs. to 15lbs. of bran per day to give good results. Where only 3lbs. or 4lbs. of bran is fed it is only good medicine. At times of the year, namely, the change of seasons, a little molasses or linseed meal will be found to do good.

*Cost of Feeding.*—We will take the first item, bran, say at 1s. per bushel, and using 100bush. for a cow means £5. Hay, 20lbs. per day for six months of the year, or 187 days, will pan out something like £8 per cow, and say 700galls. of milk are produced in the year at 8d. per gallon it will return the dairyman £23 6s. 8d. per cow. The remaining cost is the rental value of your land, say 10s. per acre, and two acres to feed a cow on grass makes the total cost of keep £14, leaving a balance of £9 6s. 8d.

*Cleanliness.*—This is a very important question, and it consists not only in keeping the buckets and milk cans clean. The most important question is to see that the cows' udders are clean before being milked, and that can only be done by thoroughly washing and drying the udders and teats with a cloth before milking to secure a clean supply of milk. Some people take a drop of water in a bucket when they are going to milk a cow and wash the udder. They then begin to milk while the dirty water is dropping from the udder. Washing cows' udders under those conditions does not tend to give a very clean supply of milk.

In reply to a question Mr. Clements said that he found crushed oats better for producing cream than bran. He would give 5lbs. or 6lbs. per day. He would not allow the calf to run with the cow for more than 24 hours after calving. He had 19 cows now. He had 13 the first three months, one came in in March, two in May, two in August, and one in September. From those 19 cows he had drawn 14,743galls. of milk, which made an average of 786galls. per cow. He found dry feed best, because it was more easily digested, and when cows were given wet feed they did not drink as much as was required to keep up the flow of milk.

## SILOS AND ENSILAGE.

Mr. E. J. F. Crawford (Angaston) read the following paper:—Any fodder crops preserved in a semi-green state by a controlled fermentation will come under the term of ensilage, and almost any farm crop. except roots and cruciferous forage crops might be preserved by this method. A silo is a practically airtight receptacle in which green fodder is stored in a succulent state. If properly gathered and packed in the silo the fodder will remain in the same state for as long a period as required without in any way deteriorating in value; it is known as ensilage or silage. Mr. Rankine, of Strathalbyn, ensiled a crop of wheat which was left in the silo for over 20 years. When opened it was found to be in excellent condition. The usual method of preserving crops for fodder has been to allow the crops to partially dry out in the fields and then store them by means of stacking. To make good hay the main points to aim at are to produce sufficient drying in the crop to prevent fermentation afterwards. There is very little difference in the cutting stages for ensilage and haymaking. Instead of allowing the crop to remain out for drying purposes it is carted at once to the silo and the process of ensilage making begun. Ensilage making is the opposite to haymaking, as the idea is to encourage, for a time at least, fermentation, which action properly preserves the food in its green state. The three principal methods are the pit, stack, and tub silo.

### Different Methods.

The first of these, the pit, has been well tried and met with varying success. This was the first form of silo, and has in late years been much improved. Its advantages over the stack silo is a better preservation of fodder throughout the entire mass, and hence less waste. In fact, in a well-made underground silo there should be, practically speaking, no waste. It is the most convenient form of silo in hill country. A cut is made in the side of a sharp hill, three sides of the silo being practically made of earth, which should be lined with timber or brick, and the fourth side or entrance should be composed of strong planks of timber held in their place by two posts placed deeply in the soil, and the planks placed, according as the pit is filled, one on the other, inside of these posts, the pressure of the ensilage from within keeping them in position. In emptying they may be removed one by one as required. It is an advantage to have these planks tongued and grooved so as to exclude as much air as possible. The advantage of a silo so constructed is that the green stuff could be carted round the hill and tumbled into the silo, and later on, when required to be emptied, the cart could be backed to the entrance and the ensilage forked on to it. Such a silo would have all the advantages of both the overground and pit silo combined. In the pit silo the most essential factor is that the walls must be perfectly plumb, otherwise, as the contents settle down, any unevenness of the walls is liable to allow the admission of air, thus causing decomposition at that place. The stack system is more of a makeshift than anything else, and is good enough for preserving green feed in really good seasons, but as a means for preserving feed for any considerable time cannot be recommended.

### The Tub Silo.

The tub silo was introduced to Australia from America about 1897, and on account of the ease with which it is both filled and emptied, has now practically superseded all other kinds of silo. It has been considerably improved and cheapened since its introduction, and is now within the reach of every farmer. In Victoria the Government will erect a silo for any farmer and accept payment in instalments. I am informed by the Director of Agriculture that it is probable a similar system will shortly be introduced in South Australia, particulars of which will be fully advertised for the benefit of South Australian farmers. This kind of silo may be built of brick, concrete, steel and wood, or wood; all of these materials having proved most satisfactory. There is no doubt that the brick or concrete ones are the best, but the cost is, to most farmers, prohibitive. Where white ants are found the all-steel is the most satisfactory; it is also proof against fire, and if the farmer is leasing property he has the benefit of being able to remove the silo when necessary. The all wood can be cheaply constructed where sawn timber is procurable, and should be very satisfactory in many parts of this district. In Australia few farmers have persevered sufficiently to master the details of ensilage making. Its value has not been sufficiently demonstrated, and, unless afflicted with drought, we do not seriously attack the problem of this class of food conservation. The recent dry seasons have forced attention, and now we find an inquiring spirit slowly being aroused on this important subject.

### The Time to Cut the Crop.

The time at which to cut the crop to be manufactured into silage varies according to the varieties used. Maize is ready when the bottom leaves are drying off and the grain is doughy but glazed. Experience has taught that the greatest amount of nutritive material is present when the cobs are all glazed. The same applies to sorghum, ambercane, and millet. Oats, wheat, rye, barley, and such crops should be cut when they are about to turn from the green to the ripening stage. At this time the grain will be fairly full and milky. Practically all thistles, weeds, wild oats, and such plants can be made into ensilage. This class of plant should be cut before the seed makes its appearance, and thus prevent the falling of the seed and consequent fouling of the ground for next season. There is no objection to seed getting into the silo, as seed of any kind that has passed through mild fermentation which goes on in a silo will not germinate. With any very green growth it is always advisable to mix sufficient of a drier material to counteract the excessive moisture, which would otherwise mean a mushy ensilage and more than probably sour. The preservation of green fodder in the silo depends on the fermentation going on in the mass, and this is controlled by the amount of air present in same. Too much air causes the mass to decompose, and the ensilage is ruined.

### Sweet or Sour Silage.

There are two distinct varieties of ensilage—sweet and sour. The former is of a deep-brown color, and has a palatable odour. It is especially good for fattening stock. The sour has a winey sort of smell, but not in any way offensive. It is used principally for milking cows, and for that purpose has proved very profitable. The two kinds may be well compared to sweet and dry wines. I was present at the opening of a pit silo in the western district of Victoria some years ago, and the sweet smell of the ensilage reminded me very much of a perfect mixture of tobacco. I have seen excellent results from the sour variety used for milking cows in South Gippsland. If the silo is filled slowly, and the material is well tramped down the air is kept out to a great extent and that arrests the fermentation. The temperature does not rise above 90deg. Fahr., and sour ensilage is produced. On the other hand, with quick filling more air is kept in the silo, which allows of fermentation to a greater extent, the temperature rising to 120deg. or 150deg. Fahr., and resulting in the sweet ensilage. Either two slow or too quick filling is not advisable. When ready to be filled the silo should invariably be painted with a thick wash, made with lime and skim milk. This wash can be put on daily, up to the extent of the proposed filling. The coating of the mixture protects the lining of the silo against the acids in the ensilage. This is an important item, and must not be neglected on any account.

### Filling the Silo.

The crops should not be cut before sufficiently matured, and every effort should be made to have the green material put in the silo on the same day as it is cut. It should be put through a chaffcutter and cut from ½in. to 1in. in length. This allows the material to be thoroughly packed in the silo, and leaves no spaces for air. It also means no waste space. Usually an elevator is employed to carry the cut material from the chaffcutter to the top of the silo. This, however, is at the option of the farmer. The elevator is by far the quickest way, and is recommended. In some cases a blower has been used with success. A chute is necessary at the top of the silo so that the material may be lodged in the centre of the silo, and from there be properly packed and tramped. It also ensures the different ingredients being evenly distributed in all parts of the silo. If dropped from the top without a chute, the heavy portions would fall in the centre and the light round the sides—the silage would not settle evenly, and a loss will probably be the result. Filling should be at the rate of not less than 5ft., and not more than 12ft. daily. A full silo thoroughly tramped and packed will shrink about 3ft. A poorly packed one will often shrink as much as 20ft. Too much stress cannot be laid on the importance of thoroughly tramping the mass as it is packed into the silo. The sides as well as the centre require equal attention. The great aim is to exclude air, and to tread all material down in such a complete way as to press out the entangled air. This is more important as the filling approaches the top of the silo, where greater energy and skill are required to perfect the packing and lessen the chances of waste. It is necessary to wait a few days to allow the column of food to settle down and concentrate. When the shrinkage has stopped the tub is filled to the surface once more and with the usual precautions in relation to treading and packing. This will also fall for a time, and it will be necessary to fill again. On completion of the filling the question of sealing the mass must be considered. The best seal is to cover the contents with a sheet made from tarred bags. On top of the tarred bags put a foot or so of chaffed straw or other waste material. This must be well set so as to encourage mould growths, which act as an airtight seal. On top of this again a heavy weight of sand or earth must be put to press down the top five or six feet of the silage. The weight of the top portion of the silage will keep the bottom pressed down, but the top requires the extra weight to keep it firm.

### REMOVING THE ENSILAGE.

When the silo is opened and all weight and waste material removed, the contents must be taken out in layers as required. On no account should holes be dug in the ensilage. The best method is to scrape off sufficient for use, and afterwards cover the remainder with the tarred bags. The less the silage is exposed to the air the better it will keep. Air is the worst enemy of ensilage. A fair daily ration for a dairy cow is 30lbs. when fed with other fodders. Sheep will eat about 3lbs. daily, but it has been found that about 2lbs. will keep a sheep in good condition. Horses should only have very small quantities, otherwise there will be trouble from stomach derangements. A few pounds daily is sufficient. In practice any green fodder that is suitable for animals in its green state is good for ensilage, and does not lose any of its nourishing material. In many cases, such as Scotch thistles, the harder fibres are softened in the process of making ensilage, and are more easily digested. I am informed that one farmer has been gathering the thistles from the road between Gawler and Adelaide for the purpose of making ensilage. Probably these thistles will prove good ensilage, as they will come out of the silo in a softer state and be more acceptable to the animals than at present. One dairy farmer in South Gippsland assured me that he had made ensilage out of every green plant on his farm except bracken fern, and had had success with the lot. As the green feed turns to dry, so does the milk supply fall off and the cattle generally get into poor condition. Generally during the spring there is plenty of superfluous green feed, and the idea of the silo is to enable the farmer to conserve this and carry it on for the summer months. No other way of conserving the feed is equal to the silo. In dry stacking all the natural juices are lost. No farmer would think of stabling his stock in the spring of the year and feeding them on purely dry feed. Why then not have the same consideration in the summer and supply feed containing the same luscious juices at the time most needed. The cattle are kept in better health with the regular ration of ensilage, the returns are materially improved, and there is less danger of such troubles as impaction and cripples. The stock relish the food, and seem to do better in every way.

### A VICTORIAN EXPERIENCE.

About 10 years ago I was in the mallee in Victoria during the big drought, when stock were dying in every portion of the State. One man had foreseen the advantages of silos, and erected several during the good seasons preceding the drought. The result was that he was able to keep all his own stock in good condition, purchase sheep at as low as sixpence per head, keep them alive with ensilage, and when other men were losing their stock and money this man was building up sufficient to enable him to retire. His ideas have now been followed by many others with beneficial results. No commercial concerns are considered sound unless there is a decent reserve fund to fall back upon. Silos for the farmer simply hold his reserves and make him independent of droughts, bad seasons, bush fires, pests, or vermin. Just imagine the happy position of any farmer during the 1914 drought with chaff selling at over £12 per ton who had had the foresight to equip his farm with a silo. Compared with the saving of money in such a year the cost of the silo is not worth considering. Those about to construct a silo I would refer to Bulletin No. 1 on Silo Construction, issued by the Department of Agriculture (Victoria). This gives full particulars of all materials required for every kind of silo, also plans and specifications and estimates of cost. An iron or wooden silo of 100 tons capacity can be erected for under £100. There is no doubt that soon a silo will be looked upon as a necessary corollary to every farm. A farmer without at least one will be considered out of date and without ambition. No farm is complete without a silo; ensilage keeps up the dairy returns, keeps the stock healthy and thriving, enables the farmer to carry more stock, spurs him on to better efforts in all his farming pursuits by increasing the profits of his farm, it also increases the fertility of his soil by keeping down weeds. No one who has fed ensilage to his stock would hesitate for a moment before stating that it is the duty of every farmer to equip his farm with a silo.

In answer to questions Mr. Crawford said that Mr. Foster, of South Gippsland, had erected two silos, and during the winter his dairy returns kept up almost to the same standard as in the spring.

Mr. Warren said that good oaten hay with crushed oats gave far better returns for cream production than ensilage.

Mr. Colebatch said that in comparing hay and ensilage they were overlooking what was wanted, and that was to obtain a succulent feed which would maintain the flow of milk at the same high rate as the green feed in spring time. Ensilage was advocated for the smaller man whom they were asking to make a similar revenue on a small block of land. They wanted him to produce enough fodder to carry the herd and give a decent return all the year round. It was not fair to compare the value of silage as food with hay,, because the food value of silage was enhanced by the fact that it was available in the season when it was of most use. In the height of summer ensilage would bring higher values than any dry feed. He did not advocate every farmer making silage, but the small farmer should apply himself to the question of silage for use as fodder in summer time.

Mr. F. Coleman pointed out that silage was not to replace hay, but to provide something in case of emergency—a sort of reserve fund in the time of drought in districts which were not naturally adapted to dairying. Dry feed did not take the place of the succulent, juicy feed which was obtained in the spring, but the silo made a good substitute. However, only the best material should be put into a silo, and if one had a good crop growing it would pay better to put it into hay than into silage.

## QUESTIONS AND FREE PARLIAMENT.

### Noxious Weeds.

Mr. F. J. Flett (Salisbury) moved—"That this Conference of representatives of the Lower North, through the local Branches, urges all landholders and occupiers to take active steps to eradicate noxious weeds." Mr. W. Sibley (Angaston) seconded the motion.

Mr. E. S. Matthews (Angaston) moved as an amendment—"That this Conference requests the Government to see that the District Councils carry out more strictly the Noxious Weeds Act." Mr. W. Patching (Angaston) seconded the amendment. The amendment was carried.

### Next Conference.

It was unanimously resolved that the next Conference be held at Blyth, in October next.

## EVENING SESSION.

Mr. D. F. Laurie (Poultry Expert) delivered an address in which he dealt with the commercial side of poultry raising. There was no branch, he said, of the agricultural industry which he knew of that offered bigger prospects and was more likely to advance than the poultry industry, because they had an assured outlet for all their products, and more production was badly required. The supply was greater than the demand before the war. Five or six years ago the United States were exporting large quantities of eggs and table poultry to England. Just before the war, in 1914, the United States had established large buying centres in France, the North of Ireland, and elsewhere to supply the American demand. That was because the enormous population of America had caused the demand to overtake the supply. The annual value of eggs and poultry in the United States was £220,000,000, and it was the biggest industry there. The industry could develop in the same way in South Australia, but it must be conducted on right lines.

### The Farmers' Loss.

Some years ago he went into the matter very carefully, and he found that the farmers were losing £60,000 per year by marketing bad eggs and bad packing. Farmers imagined that when they sold bad or doubtful eggs to the storekeeper that the storekeeper or the man in Adelaide would bear the loss. It was not so. The loss always fell on the producer. Eggs which came down to Adelaide were tested. Not all, but many of them, especially eggs for export, and the bad ones were rejected. Eggs of inferior quality were not suitable for packing and sending to the Sydney, Melbourne, or West Australian markets. When the merchants there found that 20 or 30 per cent. of the eggs were useless they had to allow for it, and the consequence was that they gave so much less for Adelaide eggs because they were doubtful, and the loss fell upon the producer. If the eggs sent to market were fresh and infertile they would be worth 3d. per dozen more. Until producers recognised that all eggs must be in the very best condition, they would have trouble. He heard people boast of the class of cattle, sheep, and pigs they produced, and they should take the same pride in the eggs they produced. Whoever sold eggs should be in a position to guarantee them as fit for human consumption. Legislation should be introduced to deal with the question, and people should not be allowed to sell stale eggs. The egg export industry was worth £150,000 per annum, but it could be raised at once to £200,000 by proper methods among the egg producers. The man whose eggs were guaranteed reseived 1d. or 2d. per dozen above the market price.

### The Prospects of Pulp.

Prices in England recently induced traders to pulp 130,000 dozen eggs here and send them to London. They cost 8d. to 8½d. per dozen and realised a good profit. It was noted as the best pulp on the London market, not only in appearance, but in quality. He would like to see the producers themselves under the organisation of a Government Department send their own eggs to London. It would pay them during the next few years to send eggs in pulp to England. The result would be that the price of eggs in Adelaide would never be less than the net price in London. He urged them to keep up the size of the egg. Many people expected the same price for mixed eggs or small eggs as large ones. But if people paid 1s. per dozen for eggs they wanted a shilling's worth. In all markets except South Australia regard was paid to the size of the eggs. They were not sold by weight, but by the long hundred. Those up to a certain weight were sold at a price which increased with the weight of the eggs. No country had gained more by the grading of eggs than Denmark, which was essentially the country of small holdings, but where they had taken care that everything they produced was first class.

### Marketing Fruit.

Mr. Smith (Angaston) moved—"That the military authorities be asked to do all in their power to make it possible to supply soldiers with dried fruit as part of their ration." Mr. Hammatt seconded the motion. Motion carried unanimously.

### Standard Fruit Case.

Mr. F. Moore moved—"That the terms of the standard fruit case regulation be altered in order that it may apply only to the metropolitan area." Mr. Hammatt seconded the motion. The motion was carried.

Votes of thanks to the Lyndoch and Rosenthal Branches, to the officers of the Agricultural Department, to those who had read papers, and to the Chairman were carried by acclamation, and the proceedings closed with the National Anthem.

## Conference of Mid-Northern Branches—Held at Laura.

The conference of Mid-Northern Branches of the Agricultural Bureau was held in the Town Hall, Laura, on Thursday, March 8th. Mr. R. Lines, chairman of the Laura Branch, presided, and there were also present on the platform Mr. G. Jeffery, Vice-Chairman of the Advisory Board; Professor A. J. Perkins, Director of Agriculture; Mr. E. H. Tuckwell, member of the Advisory Board; Mr. D. F. Laurie, Poultry Expert; Mr. George Quinn, Horticultural Instructor; Mr. H. J. Finnis, Acting Secretary of the Advisory Board; Mr. W. Mills, Mayor of Laura; and Cr. T. W. Higgins, Chairman of the Booyoolie District Council.

## OPENING CEREMONY.

The chairman, on behalf of the Laura Branch, welcomed the officers of the Agricultural Department, delegates, and visitors to the conference. Laura appreciated the honor of the conference being held there, and he hoped that all who participated in the proceedings would go away satisfied. He had much pleasure in calling upon the Mayor to welcome the visitors.

The Mayor said he had great pleasure in welcoming, on behalf of the citizens of Laura, the visitors to their town.

Councillor Higgins, Chairman of the Booyoolie District Council, also welcomed the visitors.

## OPENING ADDRESS.

Mr. G. Jeffery, Vice-Chairman of the Advisory Board, said he appreciated the remarks made by the chairman, and lustre had been added to the occasion by the presence of the Mayor of Laura and the Chairman of the Booyoolie District Council, and he thanked them. He had to apologise for the absence of the Minister of Agriculture, who wished to be present, but business of an important nature made it impossible for him to attend, and therefore he, as Vice-chairman of the Advisory Board, had to open the conference. They were passing through very troublous times, the like of which none of them ever expected to experience, and they all hoped and prayed that, in the near future, that terrible war which was engulfing the world would be concluded, and that the British arms would come out victoriously, because they were not only fighting for national safety, but for the civilization of the whole world.

### AGRICULTURAL PROSPERITY.

Along with the fearful war times had come an era of prosperity in agriculture altogether unequalled, and they had no end of reason to be thankful for the blessings which had fallen upon them. It seemed strange to him to hear complaints come from agriculturists about the wheat scheme. He took a keen interest in it as a business man, and when it was remembered that farmers were receiving 4s. 3d. per bushel for their wheat from the pool—that was a rough and tumble estimate—they must recognise that it was a higher average f.o.b. than had been obtained by the agriculturist for the past ten years. Added to the high price there was the fact that during the past two years they had abundant harvests. Last year they had 30,000,000 bushels of wheat in South Australia, and in the current year they would have something like 40,000,000 bushels. That, at 4s. 9d. per bushel, meant a sum which they could calculate for themselves. Farmers had no reason to fear anything, because their interests were being carefully watched and conserved.

### THE WOOL CLIP.

The Government had also purchased the balance of the Australian wool. He was at the first meeting convened by the Prime Minister to discuss the scheme, along with representatives from the whole of Australia, and he could say that there was nothing else possible but for the Government to take the clip. The difficulty they had to face was not the fact of taking over the clip, but the price they should get. In that respect they were ably helped by the Prime Minister, with the result that there had been no fighting at all. The prices adopted were the highest ever paid for all classes of wool. If there was one class of sheepgrower who had more reason than another to be thankful for the arrangement it was the small man, who had been protected in a way which he could not have been before. All classes of wool were provided for, even the "dags," and they got full market value for them. The experts from all over Australia met and seriously discussed some means of bringing about the fixing of a price by which each man should receive his fair share. A scheme was adopted whereby a price almost equal to the then current rate should be set down as a basis. That was worked out, with the result that, as far as they could see, the whole of the clip would come in at something like 1s. 2½d. per lb., which meant that there would be something like 1d. to divide amongst those growers whose wool had been sold under the scheme; so that, in addition to the 10 per cent. which had been kept back to cover possible contingencies being refunded, the chances were that the farmers would receive from 5 to 10 per cent. Considering the high prices for wool and wheat, he was justified in saying that the agricultural interests in Australia, and particularly South Australia, never looked brighter. They must face their difficulties, and their duty would be to endeavor to produce more than ever, and help not only the national interests, but their own. It had been said that the man who made two blades of grass grow where one grew before was a benefactor to the State, and the time was never more ripe than the present for such a statement to be made, and he trusted that the work of the conference would be in that direction. He wished the conference every success, and he hoped that they would leave it happier and better informed than when they came. He declared the conference open. (Applause).

Water, and its application to fruit trees and vines, formed the subject of an address by the Horticultural Instructor (Mr. Geo. Quinn). Mr. Quinn's remarks are printed elsewhere in this issue.

## BEST WHEAT FOR THE DISTRICT.

A paper, which will be found printed on page 1122 of the July, 1915, issue of the *Journal,* was read by Mr. F. T. Hughes, of the Laura Branch. An animated discussion followed.

## EGG PRODUCTION.

Mr. D. F. Laurie, the Poultry Expert, dealt with the question of egg production, and advocated the necessity for marketing a larger egg and a fresher egg. The latter quality could only be obtained by the production of infertile eggs. After the war there would be a big market oversea for eggs, but the trouble was that there would not be a sufficient quantity of eggs gathered to supply the demand. They must increase production, because at present they had no surplus to send to overseas markets. He would like to see a Government department formed to conduct the overseas trade in the producers' interest. In that district they were in a most fortunate position, because they had the Port Pirie and Broken Hill markets at their disposal, and they could breed both for egg production and table birds.

In reply to questions as to diseases of poultry, Mr. Laurie said that over 90 per cent. of the sickness in poultry was due to ticks and other vermin.

## DEEP AND SHALLOW CULTIVATION.

A paper with this title was read by Mr. E. G. Blesing. (For the text of the paper see September, 1915, issue of the *Journal*, page 188). In discussing the subject, Professor Perkins (Director of Agriculture) said that he knew opinions varied as to the depth of ploughing most suitable, and if a referendum were taken amongst farmers it would probably be in favor of 2in. in South Australia. It was a question whether the shallower methods of the present day were not likely to be changed in the future, and whether they would not be compelled to cultivate somewhat more deeply. He agreed that deep ploughing involved extra expense in several ways. The ploughing was more expensive and so was the subsequent tillage. The theory had been advanced that the moisture available for the crop would be found at the depth of the ploughing. That was incorrect. It could only be correct if the farmer cultivated and scarified his land to the same depth, and no one in his senses would do that. Personally he had had a fair amount of experience in deep ploughing, in a district whose rainfall was better than Port Pirie, but still not very heavy—something like 17½in. The depth they had worked on the whole of that farm for years was 7in., and the crops—where the general average of the farm, running over a period of years, was 18bush.—had been in favorable years 30bush., 35bush., and even 40bush. to the acre, and that was on comparatively deep ploughing. It was absurd for a man to say that deep ploughing was no good when he did not practise it. One year's trial on 10 or 20 acres was of no value. It was only by a systematic series of tests over a number of years that the merits of shallow and deep ploughing could be compared. The average farmer could not speak on the subject, because he had not tried. He had set up a series of experiments at Roseworthy, and the present was the sixth season. They had a series of alternate blocks an acre in extent, and they were ploughed to the depths of 2in., 4in., 6in., 8in., 10in., and 12in., the depths being accurately measured. They did not anticipate that the 10in. and 12in. would be commercially valuable, but they were simply for the purposes of comparison. Speaking from memory, the average over the six years had been in favor of the 8in. ploughing. In no case was the soil spoiled by the deep ploughing, although the 10in. and 12in. ploughing had not yielded crops proportionate to their cost. Then there was the aspect whether the deep ploughing had cost more than the value of the increased yield. There was one matter sometimes lost sight of, and that was that a good deal depended on the time of the year at which it was practised. There was another point; many people were afraid that if they brought the subsoil to the surface the soil was ruined. The old idea of trenching up inches and possibly a foot of the subsoil and putting it on the surface was not a good one, but it was quite possible to deepen the soil gradually, taking up possibly half an inch at a time. They should give it time to mellow, and in 10 years they would have deepened the soil two or three inches; and so on from 3in. to 6in. It was only by doing it gradually that it could be done without ill effects. They should do what they found best, but the time would come when they would have to alter their methods, and he was sure they would adopt deeper ploughing to a certain extent.

## NEXT YEAR'S CONFERENCE.

Mr. Curnow invited the delegates to fix next year's conference at Wirrabara. Mr. Weston invited the conference to meet at Crystal Brook. The conference decided to meet at Wirrabara.

## FREE PARLIAMENT.

### MICE IN HAY.

Mr. Curnow (Wirrabara) asked if members could give any information in regard to any method which might be employed to prevent mice destroying hay. One farmer had tried sulphur, and said it was effective.

Professor Perkins said that in England haystacks were often built on piles with inverted pieces of iron beneath to keep the mice away. Possibly they might be kept away with galvanized iron let into the ground. He thought sulphur might be dangerous.

Mr. Stephens (Port Pirie) said that he had tried sinking galvanized iron in the ground, and it acted very well if put down in time.

Mr. G. Quinn said that a gentleman in Angaston had shown him a method of sprinkling sulphur on haystacks, and he said it was a perfect preventive against the mice.

### YELLOW CLAY SOIL.

Mr. Curnow inquired the best manure to promote growth and improve the quality of yellow clay soil.

Mr. Quinn said that the first step would be to improve the texture of the soil, and he could suggest nothing better than lime as a dressing at the rate of 15cwts. to a ton per acre. As a first application it would improve the land very much. In the following year he would apply 2cwts. to 4cwts. of bonedust or super. and he would put 1cwt. of potash to the acre with the bonedust. At the end of July or August he would put in 1cwt. of sulphate of ammonia to the acre, and the result would be very marked.

### WHEAT RECEIPTS.

Mr. Sergeant moved—"That the present system of weighing wheat is unsatisfactory, and that the agent should give a receipt showing the weight of each bag."

Mr. R. E. Lines seconded the motion, which was carried.

During the evening session an address was delivered by the Director of Agriculture, and subsequently visitors and delegates were the guests of the Laura Branch at a supper held in the Town Hall.

# WATER.

## ITS APPLICATION TO FRUIT TREES AND VINES.

After some 20 years' experience travelling about all the States, and observing the production of fruit trees and vines, said the Horticultural Instructor (Mr. Geo. Quinn) in the course of an address delivered before the Conference of Mid-Northern Branches of the Agricultural Bureau, he was forced to the conclusion that, as far as South Australia and a very large proportion of the other fruitgrowing parts of Australia were concerned, water was the only means by which they were going to raise the production of fruit from being an extremely precarious mode of life to one of established profit. About 14 or 15 years ago an old resident of that district told him frequently that it was very important to urge on the people to try and get a water supply in their orchards. He did not think deeply about it then, but every year it had impressed him more and more strongly that if they were to progress extensively in fruit and vine culture they must have greater supplies of water.

### THE FUNCTION OF WATER.

The necessity for water was twofold—(1) to dissolve the constituent minerals in soil to make them available for plant food, and (2) to keep the succulent parts of the plant in a turgid, growing condition so that the nutriment might pass through the plant in functional order. Plants needed very great supplies of water. Moisture was essential to dissolve what was taken from the soil, so that it might be absorbed by the plant, because nothing was taken into the plant from the soil except when it had been dissolved in the soil moisture and passed up into the different parts of the plant. The plant system required so much more than what would appear likely that he could best illustrate it by reference to a writer on cereal crops, who stated that for every pound of dry matter in the formation of the oat crop 300lbs. of water had to be passed through the plants. That would give some idea of the weakness of the solution passing through the plant to build up the solid substance.

### SOURCES OF SUPPLIES.

In that State the sources of supply might be classed under three heads—(1) Running streams, of which they had a limited number; (2) surface catchments, reservoirs, dams, &c.; and (3) what were more widely used and distributed, the subterranean sources of supply in bores and wells. If they compared those sources of supply and their comparative value to the plants themselves, they found that their streams, with the exception of one or two—and they sometimes failed—were running fresh in the winter season, when they did not want to irrigate, but in the summer time they decreased in volume and increased in solids, so that in January, February, and March, when the ground was at its driest and they wanted great volumes of moisture, their streams were of the least value to the plants. The supplies from reservoirs and dams were the purest form of water which they had, and tests they had made in the last few years showed that there was no more valuable source of supply than that conserved from the surface during the winter season.

### SUBTERRANEAN SUPPLIES.

The water taken from wells, bores, and subterranean sources was always impregnated more or less with injurious saline substances. Owing to the soil through which it came, the water in the shallower wells was more likely to be impregnated with saline matter, and they were, to a very great extent, tampering with dangerous weapons in using them. In the analyses which had been made of their subterranean water, it had been found there were various salts, including common salt and chloride of magnesia. They also had sulphate of magnesia, an impure form of Epsom salts, but the carbonate of soda, which gave rise to the "black alkali" of the American writers was seldom found in our waters in injurious quantities. It was only chlorides, however, of which they need take much notice in their well and bore water. Through the Chemical Department a great many analyses has been made, and out of 19 samples taken along the gravelly beds of the Torrens Valley they got an average of 50gr. per gallon, and as there were 7,000gr. in 1lb. they could easily ascertain the amount of saline matter which would be put into the soil with the water they were using. Of the samples analysed the most highly impregnated reached 102gr. per gallon, and the lowest was 19gr. In the clay soil, out of 24 wells and bores examined the average was 123gr. of dangerous salts to the gallon. The highest was 321gr. per gallon from water taken at the foot of the hills near Mitcham, and the lowest was 41gr. taken on the plains towards Findon. That would give them an illustration of how those salts were collected during the percolation of the water through the soil layers which contained them.

### THE LIMIT OF SAFETY.

They had little experience as to what was too strong a solution to apply, and they had to fall back on American investigations, but he hoped, as time went on, they would have their own data as to the different actions of different strengths on plants. The American statement was broadly that in ordinary practice 70gr. of salts of all kinds per gallon was the limit of safety when used exclusively for irrigation. In using water as they used it in the Murray Valley, where the rainfall was practically a negligible quantity, and the plants depended almost entirely on irrigation, the limit of safety (according to Hilgard) would be 70gr. of injurious salts per gallon for continuous use. In a fair proportion of their fruitgrowing area they were dealing with an 18in., 24in., or 25in. rainfall on soils which were well drained, and when they used their local experience as far as it would go—chiefly gained on the Adelaide Plains—they could feel assured that under those conditions of rainfall and soil they could in their irrigation schemes use much more highly impregnated water than the figures which he had quoted from Professor Hilgard. He had known some gardens where water highly impregnated with saline matter, equalling 70gr. or 80gr. of chlorides per gallon, had been used for 20 or 25 years, and there was no evidence that those orchards had been affected by the saline contents. The ground, however, was thoroughly well under-drained, and the fall of rain might wash out in the winter the saline matter which was brought in during the summer's irrigating. On some of the more stiff loams, with clay subsoils beneath them, orchards on the plains of Adelaide had afforded evidence that the salt water had been operating injuriously for 20 years.

### THE APPLICATION OF WATER.

In regard to the methods of applying water artificially to trees and vines, they had three commonly recognised practices, viz., (1) flooding, or covering the whole surface; (2) running the water in furrows or trenches around the trees; and (3) sprinkling overhead. Flooding involved the possession of a large volume of water, but it had the advantage that, where saline waters had been used, they could practically dissolve out most of the accumulated salt, but then they would just as readily dissolve out a lot of the valuable salts, which made plant food. Flooding had the disadvantage of solidifying the soil very rapidly, and though it saturated the average soil better than other methods, the solidification was a great evil, and the loss by evaporation was very much greater. Consequently, to keep the soil in good, wholesome condition, flooding involved deep and prompt cultivation immediately after each irrigation, or the percentage of loss by evaporation would be something to be taken into consideration, quite apart from other attendant evils.

### FURROW IRRIGATION.

Supplying water by means of furrows or trenches was less wasteful, but it took longer to supply a sufficiency of water. However, it allowed more leisure in cultivating the surface after irrigation, and the evaporation was less. The soil, by such a process, was not consolidated so rapidly, because the action of the sun was not so severe on the broken up places between the furrows, as it would be if the whole of the surface had been covered by flood. There was also less draught on the animal in cultivating the soil, and there was not so much necessity for deep scarifying after each irrigation. In furrow irrigation they had to determine whether the water should be run on quickly or gently. The rate at which it should be run depended on the nature of the soil through which it was passing, and the slope of the land. If it were sandy soil it should be run quickly, but if it were stiff clay soil they must take a good deal of time, because effective irrigation under such conditions was a slow process, and if they hurried it they would find that they had not wetted the ground. Therefore, in irrigation by trenches they had to consider what was the proper period of time to give each particular plot of land to allow the water to soak through the intervening soil from one furrow to another.

### SPRINKLERS.

In regard to the third system of irrigation, that of sprinkling, he had little hesitation in condemning it, except for lucerne and cover crops, but it had one advantage in that it economised in the amount of water used. There was a system of sprinklers in use on the Murray, and he had nothing to say against them for their particular purpose. Though sprinklers had the slight advantage that they dissolved the injurious salts in the soil better than furrow irrigation, but not so well as flooding, neither was this method so likely to wash these salts out into the drainage below. Sprinkling tended to consolidate the soil even deeper than rain, and formed what was called "hard pan" beneath the cultivated surface layers.

### THE CAPACITIES OF SOILS TO RETAIN MOISTURE.

Another consideration in irrigation was the water-holding capacity of the soil. He did not mean soil that would not allow water to pass through it, but soil which held a large supply in the interstices between its particles. He had a table, prepared by an American, Professor Clinton, of Cornell University, New York, which showed that one cubic foot of pure sand would hold 27lbs. of water in suspension between its particles. The water plants ordinarily used to sustain their growth was not the free water found flowing underneath in the form of springs, but it was by means of the water which clung in the spaces between the particles in the soil known as capillary moisture, in which the plant drew its nutriment. It passed laterally, or up or down, and this was a very important point to recollect in connection with getting the fullest value from water used in irrigation. A sandy clay soil held in suspension 38lbs. per cubic foot; loamy clay, 41lbs.; brick clay, 45lbs.; humus, which was composed principally of decayed vegetable matter, 50lbs.; and good garden loam, which was the ideal they aimed at, 48lbs. A glance at these figures showed that they could improve the texture and fertility of the soil for the growing of trees and at the same time improve its water-holding capacity.

### WINTER IRRIGATION.

In the winter season, if they had the soil well drained underneath, and they ran the water through the trenches and filled the soil with as much as it would hold in suspension, that was the cheapest and best way to start upon the irrigation of deciduous trees and vines. It would be much easier to store water deeply throughout the soil when the particles of the soil were charged with water than in the summer, when they were not, and the upward pull of evaporation was at its strongest.

### AFTER TREATMENT OF THE SOIL.

In regard to the treatment of land after it had received the water—and he was assuming that most people adopted the furrow or ring system of watering—there was too much tendency to neglect a prompt policy in the application of thorough tillage after the water had soaked away. In opening the furrows they should make them as deep as possible, 7in. or 8in., or if done with a spade, more. The ground should be soaked thoroughly by running the water through slowly or a number of times. If they wished to put in fertiliser, in small plantations at any rate, they should make a greater ring, 2ft. 6in. wide, and 7in. or 8in. deep, and spread the fertiliser right around on the broken up bottom, and then turn the water into that. In that way the manure would be scattered in the spot where the roots required it, and the trees showed the results very quickly. It was essential that when the ground had been irrigated the soil should be cultivated immediately it was dry enough not to puddle, and the finer the tilth the more it would retard the bringing of the moisture to the surface and its evaporation into the air. If they only stirred the soil an inch in depth after irrigation it would save some of the moisture they had put into the ground. But if they pulverised it for several inches deeper a greater volume would be retained for the use of the plants, and that over a longer period.

The aim of the irrigator should be to wet the whole soil body occupied by the roots if possible, and to put the water down to the roots rather than induce the roots to come up to the water. The best way to ascertain whether the trees needed a drink was to test the sublayers of the soil rather than hold off until the plants themselves hold out signals of distress. The latter stage was usually an indication that injury had been done before the moisture became available, and its application then often proves it to be not an unmixed good, particularly to citrus trees of a fruit-bearing age.

# MORE LIVESTOCK ON THE LAND.

In addressing the Conference of Mid-Northern Branches of the Agricultural Bureau Professor Arthur J. Perkins (Director of Agriculture) said that he would like, on occasions of that kind, to speak on subjects of interest to the whole district, and he commended to them a suggestion which had been made, that the Branches interested in arranging the Conference might, sometime before the Conference, send to the Secretary of the Advisory Board a list of questions in which they were interested, and which they would like discussed. A practice of this kind would give time to work the answers up and to develop arguments which would make them convincing, instead of being compelled to answer *ex tempore* any question that might be brought forward. He had tried the method he suggested in other districts and had found it answer better even than a set address on any given subject. He looked upon that Conference as representing probably some of the richest and best of the State's agricultural areas, and in stating that, he implied a good and assured rainfall, and what he would have to say turned upon that particular point of view.

## INCREASING LAND VALUES.

There were quite a number of ways in which a district such as this might, in course of time, point the way to others, since there was one very powerful stimulant which forced people to make changes in practice, and that was development and increase in the price of land. The owner of the land might say that he did not suffer if his returns continued the same, even though the price of land went up, but there came a time when the younger generation came along and found that if they sold the land and took bank interest their income would be greater than if they continued to farm it on the old lines. If they took the farming practice in that district, or in districts similarly situated, they knew that wheat and bare fallow followed regularly one after the other. In the end that meant that they were making two acres do what in other countries one acre was doing, or they were taking two years in growing a crop of wheat instead of one, or, if the land was worth £10 per acre, they were to all intents and purposes growing wheat on land worth £20 per acre. Now they wanted to see whether, by some means or other, they could not make higher average returns from the land. They found, in the past, in other countries, that land had been treated very much as it was being treated in this State, but as land values went up other methods were adopted. One of the first plans adopted was to grow a second crop—not necessarily wheat. There were many districts in which it could be done in South Australia. They could have bare fallow, wheat, and some other crop, and by using the land for an additional season reduce the loss of letting it lie idle for 12 months. Then it would be possible to carry more livestock, and it was on that question chiefly he wished to engage their attention.

## THE AVERAGE FARM FLOCK.

The number of farmers who had livestock to the capacity of their land and farming operations was very limited. A farmer usually carried a small number of sheep, equivalent to the carrying capacity of his pasture at the worst time of the year. Such a policy reduced him to a very limited number of livestock. On stations sheep have been kept for several generations, and certain ideals have been formed, namely, that the land must not be overstocked, and that no more sheep could be kept than the land would carry in the worst kind of year. With farmers, similar ideas seem to have been adopted, but they should rather endeavor to follow the practice of other countries in which sheep were maintained on land which was not managed on station principles. That was what should happen in this State, especially in a district such as this. Farmers said that if they had more sheep than they could handle on the natural pasture the sheep would lose condition and possibly die. They forgot that in most countries in which sheep were fed and handled in that way a profit was made, and sooner or later they would have to come to the same practice in South Australia. Some years back he had prepared a paper showing the carrying capacity of a farm like Roseworthy, and he would quote one or two of the points he made. First, over a period of nine years they carried roughly a sheep to the acre on a comparatively large farm of about 1,600 acres. They never had one-third of the area out of tillage. That was accomplished, not by restricting the sheep to natural pastures, but by handling them in the proper way and hand-feeding them for periods which never exceeded three months. There was no question that the natural herbage on well-conducted farms was very rich, and that they could keep a larger number of sheep than on station property. In 1905 the equivalent of three or four sheep to the acre were carried on some Roseworthy fields. That did not mean that three or four sheep to the acre were put on a field and kept there for a year, but it meant that they were put in a field for a time, and then changed to other fields, brought back again, &c., a record being kept of the number of days they were on and the number of days they were off a particular field. That was not quoted as the normal capacity of the land.

### Crops for Feeding Off.

The whole position was that the farmer would have to decide that portion of the crops he grew were not saleable crops in the same sense that wheat was, but they would have to determine to grow crops which could be fed down, the advantage of the practice being represented by the proceeds of livestock sold in the market. It was worth while emphasizing the advantages derived from a practice of that kind. They knew that the constant practice they followed of bare fallow and crop had an effect which must operate against the mechanical condition of the soil sooner or later. The more land was treated as bare fallow and the more perfect the practice the more the organic matter in the soil, which was essential to fertility, was destroyed. The practice was satisfactory as long as the land was new, but in time the land began to fail and lose its original fertility. This difficulty could be dealt with artificially by dressing the fields with farmyard manure, but it was an expensive practice, and, though adopted in other countries, where labor was cheaper and fields smaller than in this State, it could not be recommended here. There was no cheaper method than that of turning livestock into the rank strong growing crops. It was the practice in England at one time when they manured land, to put one sheep to the square yard on it for 12 hours, and the droppings in that time were regarded as equivalent to a light dressing of farmyard manure; 24 hours were regarded as an average dressing, and 36 hours as a heavy dressing. A sheep to the acre per year represented from one-half to three-quarters of a ton of organic matter per acre. A rank crop like kale would carry 20 sheep per acre for three or four months, and that meant a large amount of organic matter applied to the soil. Keeping livestock in larger quantities ought to be not only directly profitable, but there was that indirect advantage which would be reaped in time in the shape of the increased yields of crops when land of that character came under ordinary agricultural operations.

### SMALLER FIELDS NECESSARY.

When he took over Roseworthy in 1904, he was imbued with the idea of stocking it up. There were then 120 sheep or thereabouts on the farm. From the outset he was faced with the difficulty that the fields were too large—200 or 300 acres in extent—and he soon realised that he could not keep large numbers of sheep on a farm in that condition. He set about subdividing the fields, a long and expensive process. It was out of the question to attempt to keep an adequate number of sheep on the large paddocks which obtained in South Australia. In such conditions the keeping of livestock was possible, not in proportion to the area grazed, but according to the number of fields at one's disposal. The first item, therefore, towards augmenting the number of sheep was to increase the number of fields. It was the general experience on a farm that a large number of fields was needed to put a large number of sheep on a relatively small area. So that they could be shifted constantly from field to field, in order to give the grass time to grow, and to give the sheep constant change. At the present time such work was more expensive than ever, owing to the cost of wire, labor, &c. Then there was the question of water. If there were many fields there would be as many points where water would have to be provided, because it was not a wise practice to drive animals constantly to water. It was necessary, therefore, to have reticulation, and that could be provided, even if they were not connected with the Barossa or Beetaloo water schemes. Whether the supply was from wells or dams they could reticulate by means of a windmill or storage tanks. Two things therefore stood out in augmenting their flocks of sheep, and they were that they must have small fields, and they must have water. There was also the difficulty of fencing. One of their inheritances from station methods was the station fence, which was altogether inadequate for farm purposes. Good fences were essential. It was better to have an extra wire or two, and make the fences quite sheep-proof. He thought eight wires were necessary, but perhaps seven would do. With Crossbreds, if there was a crop on the other side of a six-wire fence they would get through; seven wires on a swinging fence he had found effective sometimes. Then there was the question what would be a reasonable number of sheep to keep on a decent sized farm. At Roseworthy he kept a sheep to the acre, but, given average conditions, and there were districts better than Roseworthy, and some very much worse, he felt sure that in fair country, if they had one-third under crop and one-third bare fallow, they could keep, with careful management, two ewes to the acre on the land that was left for grazing pastures, provided they were prepared to grow grazing crops in reasonable proportions. They could thus carry 400 ewes on a farm of 600 acres, helped along by grazing crops and hand-feeding wherever necessary. A mistake was often made by not feeding the livestock until the pastures were bare, but they should look ahead and commence handfeeding whilst there was still feed in the fields.

### The Farm Sheep.

As to the kind of sheep to keep, his opinion was that, excellent as the Merino was on the station, and despite the many advantages it presented for farm purposes, it was not equal to good long-wool crosses of the half-bred Lincoln or Leicester type. The half-bred ewes made better mothers, and looked after their lambs better, and when they came to the question of fleece it was always of good, saleable type. With handfeeding, while the Merino would take the food when driven to it, the Crossbred sheep would take it readily. They kept their condition better than Merinos under adverse conditions. Another advantage which Crossbreds possessed over the Merino was that they bred more readily as two-tooths. He had therefore personally come to the conclusion that for farm purposes the Crossbred sheep was preferable. He had tried to outline what appeared to be the line of improvement which was likely to relieve the more pressing wants in farming districts where land values were likely to rise, and he felt certain that, in the course of time, they would gradually work down to something of the kind. They should recollect that by increasing the livestock which their land would carry, they were tending not only towards benefiting themselves, but also the whole State.

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## BOT FLIES.

The constantly recurring question as to whether bot flies bite or sting can be settled by any man of ordinary observing powers if he will catch one and see that it has no puncturing apparatus in its mouth and no sting behind. The thing that is mistaken for one is the egg-laying shoot, the ovi positor. A member of the Advisory Board recently lost a mare by accident, and like a wise man, made a *post mortem.* The stockman of long experience who made it said it was the first horse in which he had not found bots. The reason for their absence was that the owner made a practice of wiping over the chin and back of knees with kerosine and oil before starting out. Like the conjurer's tricks, it is simple when you know how.—Fras. Evelyn Place, B.V.Sc., M.R.C.V.S.

# VINES.

## FUNGOID DISEASES AFFECTING THE VINE, AND THE GRAPE CROP FAILURE.

The morning session of the Conference of the Lower Northern Branches of the Agricultural Bureau was of particular interest to those engaged in vinegrowing. Mr. H. E. Laffer, Viticultural Instructor and Lecturer at Roseworthy College in viticulture, fruit culture, and oenology, contributed a paper on fungoid diseases of the vine, and Mr. A. Springbett, of the Angaston Branch, read a paper entitled "The Grape Crop Failure."

Mr. Laffer, in the course of his paper, said:—Of all the diseases affecting the vine, by far the greater number are of fungoid origin. These fungi represent some of the lowest forms of plant life, and are mostly of a parasitic nature, living upon the tissues of the host plant, and drawing therefrom the nourishment wherewith to carry on their own life processes. In this manner they have an exhausting effect upon the vine, diverting the sap from its normal course, and depriving the affected plants of their means of sustenance. Many affect the growth and foliage, reducing it to such a condition that it is unable to perform its proper functions. Even if the injury so caused is not of a very serious nature, the harm done is indirect, and other parts of the plant, particularly the fruit, suffer, because the foliage is unable to carry out the physiological functions for which it is responsible. The fruit bunches are so injured, in some cases, that even if not completely denuded of berries, the fruit becomes more or less useless by reason of its distorted and injured condition, or by reason of the presence of the growing portions of the fungus or mould.

### CONDITIONS FAVORABLE TO DEVELOPMENT.

There are certain conditions essential to the development of these diseases the two most important being warmth and moisture. Dry heat, in most cases, effectively checks an outbreak, while cold temperatures prevent or retard their development. We know from experience in South Australia that epidemics of fungoid diseases are very irregular in their appearance, not because they have been stamped out, but for the reason that atmospheric conditions do not favor their development. Consequently, when all conditions combine to favor an outbreak, we are, to a certain extent, caught unprepared. In the older vine-growing countries, particularly in Europe, the problem of dealing with these diseases is an annual undertaking, for they are so numerous that conditions in most years are favorable to one or the other. Speaking generally, the climate of South Australia, or Australia for that matter, does not lend itself to this class of pest, and under these circumstances it is questionable whether any costly outlay for dealing with them is necessary or would be warranted. It must be remembered that in Australia, where the bulk of our vineyards are of considerable area, and where cost of labor is high, coupled with a low average return, the conditions are very different from those of

France, where the greater number of the vineyards are less than five acres in extent.

### METHOD OF SPREADING.

It has already been stated that these diseases represent some of the lowest forms of plant life, and their mode of propagating themselves is distinct from that of the higher plants. They develop from spores in the first instance, and transmit themselves during the growing period by fresh spores, or by throwing off portions of their growth, which in turn start new centres of infection. Most of these fungi possess the power of reproducing at an incredible rate under suitable conditions, which explains the fact that a vineyard apparently free, will in a few days become very badly affected, possibly beyond remedy for the season. During its active growth, the fungus throws up columns bearing minute more or less globular bodies, which are the summer spores, and each one of these is capable of starting a fresh centre of infection upon the same or upon surrounding vines. They may be carried long distances by wind or other means, and cause an outbreak far from the original centre. As each spore germinates the disease rapidly spreads, the myriads combining in their growth to form clearly evident masses, and the vines or their affected parts suffer accordingly. This aspect of the disease is known as the "conidial" stage, and the conidiae or summer spores are the method of spreading the fungus. All these diseases must have some means of transmitting themselves from year to year, and to this end, on the approach of autumn a change takes place in the mode of reproduction. They no longer produce simple spores, but develop a stout pocket or sack, known as an "ascus," which contains a number of smaller spores. These pockets or sacks are protected by a thick cellular wall, which is capable of resisting the winter's rain. Throughout the dormant period of the vine these winter spores remain inactive upon the old wood or upon the soil. On the approach of spring, warmth coupled with moisture causes the cell wall to rupture, the enclosed spores escape, and if conditions be suitable, they restart the disease by attacking the young growth. This is known as the ascigerous stage, and is often so different to the former conidial stage as to appear like an entirely distinct fungus. Such is the case with our common vine disease, Oidium (*Erysiphe tuckeri*), which appears to be only the conidial form of the American Oidium (*Uncinula spiralis*). For some reason or other, under our conditions the ascigerous stage is wholly or partially skipped, as is the case with the same disease in Europe.

### HABIT OF GROWTH.

In all these fungi, as with the higher forms of plant life, there are two distinct portions. The one is devoted to the gathering of nourishment, corresponding to the root system, while the other carries the organs of reproduction or spores, and corresponds to the vegetation of the plant. The former is termed the mycelium, and the latter are known as conidiophores. The character of the mycelium has an important bearing on the remedial treatments, which are based on the nature of this mycelium. We find that it appears in two forms, and on these we are able to divide the fungi broadly into two classes. 1. The

*Epiphytic* forms, in which the vital portion of the growth or mycelium is external and is visible to the naked eye, forming a mouldy coating on the affected portion of the vine. In this class the spores alight upon the young wood, leaves, or fruit, and upon germination they strike into the tissues by means of a short sucker or *Haustoria.* Through this sucker it draws nourishment from the host plant, and then proceeds to traverse the outside of the tissues by the development of thread-like filaments of mycelium, which in turn develop haustoria at regular intervals. As the trouble extends the bark is pierced by countless numbers of such bodies, draining the vitality of the vine. After a time the reproduction columns begin to develop, rapidly shedding their spores for the continuation of the disease. All this class of fungi are comparatively easy to deal with provided that the remedies are applied in good time. 2. The *Endophytic* forms, in which, from the germination of the spore, all the mycelial development takes place within the tissues of the plant. Such diseases are almost impossible of treatment once they have obtained a hold, for they cannot then be destroyed without at the same time destroying the plant or the portion of it which may be affected. The spore develops and strikes inwardly, the mycelium traversing the spaces between the plant cells and extracting nutriment from them. In their methods of reproduction, the spore-bearing columns arise, either by rupture of the diseased tissues or by emerging through the stomata or breathing pores of the leaves. The conidiophores may be single or branched, shedding the spores as they mature on to the surrounding foliage. This class of disease, it will readily be understood, is of a much more serious nature than the former type, and they number amongst their members some of the most destructive pests affecting plants in general.

## REMEDIAL TREATMENT.

The principles of remedial treatment are based upon the nature of the fungus. As already stated, the epiphytic, or external growing forms, are comparatively easy to deal with after they have made their appearance upon the vine. The delicate mycelium is so sensitive to certain substances as to be readily and completely destroyed if prompt measures are adopted. As a class they are destroyed by ordinary sulphur or substances containing sulphur, such as potassium sulphide. Probably the commonest disease of this class with which vignerons are familiar is the so-called oidium, or powdery mildew of the vine. The second class, or those of endophytic origin, are far more difficult to deal with, and in a large measure the treatment is of a preventive nature. The spores must be destroyed before they can germinate and become enclosed within the tissues of the plant. To this end caustic or corrosive solutions are employed, the surface of the vine being coated while the spores are yet dormant, and the solution kills them by contact. Such remedies must of necessity be harmless to the vegetation of the vine. As typical examples of this class of fungi, we may take the anthracnose, or black spot of the vine, which has been fairly prevalent during the present season, also the downy mildew, so common in Europe. This latter is one of the very worst forms of fungi affecting the vine in the older countries, and it is interesting to note that its presence has recently been reported in Victoria. Australian climatic conditions, however, will probably prevent it ever becoming a serious menace, although if it is about, isolated centres will always be more or less affected. Notwithstanding this, it is a disease which we can very well do without. In Europe its treatment is costly, necessitating frequent sprayings with fungicides, and its presence can, in a very short time, result in the total failure of the crop.

## OIDIUM, OR POWDERY MILDEW.

The *Erysiphe tuckeri* is called the powdery mildew to distinguish it from the downy mildew just referred to. The conditions essential to its development are heat and a moist atmosphere, and for this reason we find that our climate is not always conducive to its appearance in the vineyards. Heat it must have to make rapid headway, and moisture in the atmosphere is essential for germination of the spores. Development commences early in the spring, when the growth is comparatively young, from 6in. to 12in. in length. It appears first as a discolored patch of a greyish tinge, usually near the base of the canes and travelling in an upward direction. Its growth at first is slow, but increases as the days become warmer. As the patches spread they can be rubbed off, and if the bark is examined closely it will be seen that there are numerous minute punctures in it. These represent the holes made by the penetrating haustoria, and in the more advanced stages they coalesce to form dark-brown patches on the mature bark. The organs of reproduction are seen by the aid of a microscope as club-shaped bodies rising from the mycelium, and which, on reaching maturity break off into segments, each being a perfect summer spore. Thus the disease is spread by these spores germinating to form new centres. Given humid conditions, it increases more rapidly as the heat rises to about 90deg. in the shade. From this point higher temperatures check its progress because they are, as a rule, accompanied by a drying of atmospheric conditions, and the new spores are unable to germinate. These temperatures, accompanied by humid atmosphere; result in extremely rapid development, and it is at this season that the great injury is done to the green fruit. Temperatures of over 100deg. will check and destroy the mycelium when the atmosphere is dry. In bad attacks canes and leaves are affected, reducing the vitality of the vine. Fruit in the green stages is open to attack, becoming matted with mycelium and useless. Even in milder visitations the fruit may be affected indirectly through the suffering condition of the foliage. Although oidium is the commonest disease with which we have to deal, it is not every year that conditions are conducive to its development. and as it is one which can be treated after its appearance, there is no great difficulty attached to it. Weather conditions are an indication of its possible development, and when such as those described prevail in spring it is wise to keep a look out for the first signs of trouble. Certain localities have been proved by experience to be subject to the disease, and in these it is always wise to be prepared to fight it. The common remedy, as is well known by every vigneron, consists in dusting the vines with finely powdered sulphur, which by contact with the mycelium or by the evolution of sulphur gas, irritates and destroys this vital portion of the fungus. Heat accelerates the action of the sulphur, causing a more rapid evolution of gas and a greater irritation by contact. Hence hot weather is the best time to sulphur, and in all cases the foliage should be dry. If this is not so, the sulphur tends to gather in heaps rather than as an even dusting upon the surface. One, two, or more treatments may be necessary in persistent cases, every effort being made to check the incipient stages and prevent it extending to the fruit. The common method for applying sulphur is by medium of a mechanical bellows which delivers the sulphur as fine dust upon the vines. Other devices are adopted, such as a small hessian bag, but the former is more economical. In extreme cases horse-worked machines are used. It is interesting to note that oidium, possibly owing to climatic conditions, does not pass through the ascigerous stage of development in Australia, or, at any rate, the winter spores have not so far been isolated. The European experience was somewhat similar, and it was upwards of 50 years from the original outbreak in Europe before the winter form was isolated and identified with the *Uncinula spiralis* of America. Possibly it may be that some portion of the mycelium is perennial here, or else that the ordinary summer spore is capable of retaining its vitality from one season to another.

### ANTHRACNOSE OR BLACK SPOT.

*Sphaceloma Ampelinum (Viala), Glœosporium Ampelophagum (Massee).*

This disease is typical of the *Endophytic* types, and is of particular interest just at present, because it is, or has been of late, very prevalent right throughout Australia. It is even more irregular in its appearance here than *Oidium,* hence one outbreak is forgotten before the next occurs. So far as the present prevalence of *Anthracnose* is concerned, it so happened that climatic conditions during October and November were ideal for its development in many localities, just as they were not favorable to the growth of *Oidium.* The cold, wet conditions which favored the former checked the latter. *Anthracnose* is one of the destructive fungi which must have free moisture for its progress, even though the temperature is comparatively low. Absence of free moisture upon the vegetation of the vine debars germination of the spores, and we have no sign of the disease. The continued rainy weather of October and November supplied the conditions most suited to its development, and at the same time, although atmospheric conditions were moist it was too cold for *Oidium* to grow. The spores on germination strike inwardly, and all the future development is internal. The tissues are killed in patches, resulting in dark spots and hollows, hence the vernacular name. At this stage the disease may become arrested through unfavorable weather, but if such is not the case, the wounds increase in size and often join together. The shoots become twisted and black, frequently breaking at the wounds. The whole vine becomes sickly, as the leaves are also badly affected and drop off. The fruit bunches are destroyed by attack upon the stalk or framework, while at a later stage the berries are attacked and suffer according to the severity of the infection. Summer spores are developed within the wounds, consisting of masses of spores joined together by a gummy substance. Before these spores can spread and continue the infection, they must be freed from the surrounding substance by the agency of free water. They are then carried by the water over the vine or by other agencies to surrounding vines, renewing and spreading the disease. Winter spores form late in the season as stout pockets containing several individual spores. They are distributed over the bark and permanent portions of the vine, also upon the soil by decaying leaves, where they lie impervious to the winter rain but ready to resume so soon as conditions become satisfactory.

### TREATMENT.

Summer treatment is practically out of the question, and therefore methods of eradication must be preventive, and they aim at the destruction of the winter spores. It is necessary to reach these spores as they rest upon the vine during the winter with solutions which will corrode and destroy the thick walls and the spores within. The remedy most generally used where this disease is prevalent consists of a mixture made with 50lbs. sulphate of iron, half a gallon of commercial sulphuric acid, and 10 gallons of boiling water. Mix the acid and sulphate of iron in a wooden or earthenware vessel, and then add the water boiling hot. Stir thoroughly, and the mixture is ready for immediate use. Owing to its corrosive effect upon metals, it is not possible to apply with any form of pump, and the mixture has to be swabbed on to the crown of the vine. The best time appears to be about a couple of weeks before the buds burst, because at that period the walls of the winter spores are beginning to soften, and are more easily destroyed. Calm, fine weather should, if possible, be chosen for the application. Another solution which is said to give good results is a 10 per cent. mixture of sulphuric acid—1gall. to 9galls. water. Subsidiary treatments may be carried out during the growing period, such as dusting the foliage with fine gypsum or powdered sulphate of iron, which, however, are merely intended to dry the leaves, and thereby prevent germination of the spores. For convenience these powders may be mixed with sulphur when treating for oidium. Possibly the application of Bordeaux or Burgundy mixtures would have a deterring effect in preventing germination of summer spores. Experience has shown during the present season that there comes a time when the disease is arrested by climatic conditions, and we find that vines which were badly affected say up to the end of December, made good healthy growth during January. The question has arisen as to the advisability of summer pruning the vines. This is a course which might well be recommended, removing and destroying affected canes and rods which have become useless. The general effect should be to throw more vigor into the young healthy wood, and give a reasonable chance of some sound canes to prune to next year. It resolves itself into a question of time and labor, but where it can be done the work has much to recommend it.

## THE GRAPE CROP FAILURE.

Mr. Alfred Springbett read the following paper:—Most vinegrowers are disappointed at the very poor setting of grapes this season. No doubt those who depend on the vines alone for their living will receive a very hard knock, as I think the crop is no more than a third of normal seasons. This, again, depends on the varieties grown, as I think I can safely say that Mataros and Doradillos are a complete failure. Some varieties that are not so badly affected are Sweetwater (hardly noticeable), Black Portugal (slightly), and Shiraz (about half the crop). Of course, I am speaking from observations taken at our Hillside Vineyards, but I believe other vineyards in the district are similarly affected. Most of the growers are looking for a reason for the non-setting of the fruit. My opinion is that excessive moisture and cold at the time of blooming is the chief cause. Of course, some vineyards were in parts cut with frost, and later were severely beaten about with hail, which did an enormous amount of damage at Hillside, cutting branches 18in. in length back to 6in. or 9in. This gave them a big check, as they seemed to be at a standstill for a long time. Just prior to the hailstorm, there was every indication of a bumper crop, especially on the Carbinet Sauvignion and Carbinet Gross. Later, when grapes had set, they were very uneven, there being berries as large as peas, others half that size, and still flowers on the same bunch. Another thing I have noticed is that at the present time, instead of the wood being brown from the base upward for at least 12in. or 18in., as it should be, it is a pale-green color. The stems of the bunches should even be brown for at least a quarter to half an inch from the branch. I have an idea that late-pruned vines are not so badly affected. The latest-pruned vines in our own vineyard have the best crop, and that is the Grenache and also the Sherry. I mention this because in another portion of the vineyard a piece of Grenache was pruned early, and the crop was a complete failure.

### THE DISCUSSION.

Mr. Gilbert said that he understood from Mr. Laffer that the winter spore of the oidium had not been identified, and he would like to know whether any steps had been taken in that direction. If Mr. Laffer could indicate where they might expect to find the winter spore, it would be good work.

Mr. Laffer said that had been looked into by mycologists, but they had failed. In America the winter spore had been identified as the Uncinula spiralis. So far as the winter spore was concerned, it was enormously difficult to attack it on the vine, nor was such necessary. The character of the mycelium laid itself open to attack in the growing period, and for that reason oidium was looked upon as one of the easiest of the pests to eradicate.

Mr. S. O. Smith (Angaston) said he would like some explanation in regard to the failure of the grape crop. Very late-growing vines had produced the best crop, and late-pruned vines had also done well. In regard to anthracnose, he would like to know whether the spore remained on the bark or the old wood of the vine.

Mr. Laffer said that it was generally understood that when the leaves were falling from the vines they distributed the spores over the whole of the crown of the vine, and, by decay, upon the surface of the soil. It was not sufficient to treat only the annual wood upon the secondary arms, because the spores would rest where there was the best lodgment, and that was in the rough bark of the older portions. In regard to the non-setting of the vines, he thought it was entirely due to the unsatisfactory weather which prevailed when the flowers were on the vines. The flower of the vine was not like a rose, which when it opened exposed its reproductive organs. The part in the vine flower which represented the corolla or petals of the rose was represented by a cap, and that cap had to be pushed off before it could expose the reproductive organs underneath. The expansion of the stamens raised up the cap and threw it off. The stamens rose up and turned outwards, so that the pollen (the fertilising agent) would fall upon other flowers. Nature in that way prevented self-fertilisation. The stigma, which was the female reproductive organ, was directly under the pollen-bearing stamens, and when, from any cause, they were fertilised by the pollen of their own flowers, there was a poor setting. When the conditions were unfavorable, the pollen of the stamens was turned on to their accompanying stigma. The busting of the cap, and the turning outward of the stamens was one of Nature's provisions that self-fertilisation should not take place. But that was what had happened this year, and that was why the crop had partially failed. Looking back at the weather, they might wonder that the crop had been as good as it was. The flowers, owing to the weather, had held the cap for a fortnight or three weeks, with the result that there had been self-fertilisation, and a poor crop. The explanation of the late-pruned vines bearing well was that the late pruning threw the growth of the vine back two or three weeks, and then when the flowers came the bad weather had passed and the fruit set in the proper way. Some vines which had been cut back late, and which flowered in November, were bearing a beautiful crop.

Sir Richard Butler asked why it was that the Sweetwater crop was very good this year in his vines, and the Muscatel crop, growing close to it, was almost a failure.

Mr. Laffer said that different varieties of vines flowered at different times. The Muscatel was a notoriously bad setter at any time, and the Sweetwater, which was a good setter, flowered before the Muscatel. Probably the Sweetwater got in a day or two before the very bad weather came on. Even a day or two in weather like that was sufficient to bring about good flowering in one variety and bad in another.

Mr. Thurm (Angaston) said that oidium might be killed with sulphur, but it was useless to wait until the disease appeared on the vine. It should be applied as soon as the vine began to shoot. He had known men use hundredweights of sulphur in February, but then it was wasted. He would like to know what should be done after the disease appeared on the vines.

Mr. Laffer said he did not imply that they should let the disease get a hold of the vines before dealing with it. They should first apply sulphur before the shoots were 6in. in length. Then it could be dealt with. He had seen oidium allowed to get to that stage when the vine had dense foliage, and to deal with it became an impossibility. In vineyards where it was likely to occur they should watch for it. It was readily detected in its earliest stages, and then when the weather conditions were favorable sulphur should be applied. In Europe they gave the first sulphuring when the vine was bursting, and the second a fortnight after that. As a rule they had to sulphur at least three times, the second occasion being just about flowering time, when there was no great amount of foliage, the third about two weeks later. When the foliage was full it would be found almost an impossibility to handle it.

A delegate from Salisbury said that the question of irrigation had not been touched upon. The vines required irrigation, but he wished to know whether the class of water obtainable was suitable. The water contained a fair amount of magnesia. He was growing Grenache grapes for wine.

Mr. Laffer said that the best plan would be to submit water for analysis, in order to ascertain the exact mineral contents, and then they could judge whether it was suitable or not. Irrigation was not required for Grenache vines for wine in the Salisbury district; the natural rainfall should be suffiicent.

### FRUIT TREE AND VINE PRUNING.

Mr. F. Coleman said in regard to the question of pruning, which had been incidentally referred to, he would like to point out that the Clare Branch of the Agricultural Bureau had been conducting pruning demonstrations and competitions for some time, and they had been a great success. He thought that some of the Branches in that district should institute fruit tree pruning competitions. Excellent work of that kind had been done at McLaren Vale, but not in connection with the Agricultural Bureau. There was scope for the young members to take an active interest in the pruning of vines and fruit trees, and he thought it would be an advantage for some of the Branches to take up the work.

## IMPORTS AND EXPORTS OF FRUIT, PLANTS, ETC.

During the month of February, 1917, 2,457bush. of fresh fruits, 10,828bush. of bananas, 577 bags of potatoes, 10 packages of vegetables, 34 packages of plants, trees, and bulbs, and 1,207 empty wine casks, &c., were examined and admitted at Adelaide and Port Adelaide under the "Vine, Fruit, and Vegetable Protection Acts of 1885 and 1910"; 546bush. of bananas were destroyed, being overripe, and 252 wine casks, &c., were fumigated. Under the Federal Commerce Act 500 packages of dried fruit and 558 packages of preserved fruit were exported to oversea markets. These were consigned to London. Under the Federal Quarantine Act 779 packages of seeds, fruits, plants, bulbs, etc., were examined and admitted from oversea sources.

# SOME COMMON TROUBLES OF THE COW.

In the course of an address before the members of the Pompoota Branch of the Agricultural Bureau, the Government Veterinary Lecturer (Mr. F. E. Place, B.V.Sc., M.R.C.V.S.) mentioned that dairymen in that locality would be faced with a run of troubles that would crop up with great persistency, but mostly they would be of such a nature that they could be easily dealt with at the outset.

Confining their attention to the cow as a dairy animal, they would find that the amount of milk and the duration of the milking period would be very materially affected by proper management. The cow that was not naturally a good milker might be kept in the dairy as a fairly profitable milker if properly looked after. On the other hand, if milked at irregular periods, and fed in irregular ways, she certainly would not be a profitable milker. There was no need for him to emphasise the advantages of keeping records of their cows. From his very earliest days that feature of dairying had been impressed upon him. The men who composed his audience particularly needed to know the value of their cows, and that could only eventuate through the medium of records, which entailed practically no expense, and only a few moments of the dairyman's time. He certainly concurred with those of his colleagues who preached that doctrine. It enabled the cow owner to discover whether a cow was worth keeping or not.

Essential points in connection with the cow were the methods and times of feeding, including watering, and also housing. In the latter connection nothing elaborate or expensive was needed; a straw stack would possibly suffice. They would find it necessary in these parts to thus protect their beasts against the elements in this manner for some months in the year.

### THE INFLUENCE OF TEMPERATURE.

They had experienced the early morning cold, and at such times the cow was functionally active, and required a little attention before giving her morning milk. The sudden drop of the temperature in such river districts as Pompoota had something to do with two or three common ailments they met with. It also seriously affected the regular milk flow. He knew of no domestic animal which responded more to punctuality than the cow. If she knew a regular hour for milking she would so adapt herself to give the best returns. Choice of feed was an essential factor. Too much sappy green feed, lucerne, &c., was liable to cause the best mannered cow to overdo it. If she had a chance of getting dew-wet or shower-wet lucerne, or possibly lucerne from which the river water had been drained and so forth, there was the danger of rapid fermentation in the paunch. That could be very materially checked by a systematic method of giving dry feed, somewhere about milking time. It did not matter whether before or after; both times had their merits. The combined method of lucerne feeding and systematic dry feeding would considerably lessen the possibility of blowing or bloating, as it was so called, than if the cow rushed into her feed in the early morning and gulped as if she would burst. They should understand that when the cow fed in that manner it was rushed down into the paunch (which had a capacity of about 50galls.) only partially chewed. It was just sufficiently chewed to enable it to go down; the whole amount had to be rechewed as cud. He would like to lay stress upon that point. Some people seemed sceptical regarding the fact that the cow would bring up such a large amount and chew it all again. But it was true, and within the third part of 24-hours' day the whole would have been chewed as cud. She accomplished that in some sort of restful position; in the shade she would set to work and wilfully vomit up parts of the material in her paunch. That matter was very much softer than when it went down, and the effort of bringing it up causes a certain amount of juice to come into the mouth, which aids her in her work. The cow would give one or two chews on one side, and passing it over to the other, keep on chewing. She would chew it 66 times on an average before letting it down again. Mr. Place explained that that food did not go down again to the paunch, but into the third stomach, staying but a little while in the fourth, until the whole of the nutritious matter had been absorbed and the remainder released to the bowels. The speaker explained the functions of the bowels, and the method of blood supply to the liver. If the process of food digestion was interfered with or those functions impeded in their work bad results would naturally follow. They would readily recognise that the first interference with those functions would be failure to chew the cud. It would result in the whole of the process from the return of the cud to the third stomach and onwards being interfered with and retarded, and therefore one of the earliest symptoms of a cow off color was apparent in the failure of the cow to chew her cud regularly or evidencing difficulty in doing so. If, on being watched, she was found to be uneasy and made an effort to bring up the food and failed, made a stronger effort and failed again, it would then be advisable to give that cow something to open her bowels.

### Drenching the Cow.

He had advised them not to drench horses, but they had no need to be so particular in respect to the cow. They should pass the left hand over the head of the cow with their fingers in her mouth, and place the bottle containing the material in her mouth, and when she began to swallow they could let the whole of it run out fast without any risk of choking her. Many drenches were given to cows too hot. What might seem the right temperature to the man may be uncomfortably hot in the mouth of the cow. The best way of determining the right heat was to pour a little of the material into one's hand, and if too hot to hold to wait until it cooled a little.

After a cow had filled herself with damp lucerne it would be found that it was rapidly being converted into gas. The animal would first begin to fill out on the left side, where four-fifths of the paunch lies. The V indentation or cavity in the left flank disappeared, and shortly afterwards the right side swelled too, and the cow generally would begin to swell. In the ordinary way no material inconvenience would occur if it did not go any further than that stage. Having noticed that, however, they would do well to give her something to open her bowels. If they delayed and found her and some of her companions blowing up very rapidly they might soon find them with their toes turned up and resembling greatly a reversed milking stool. When that acute stage was arrived at, it was time to do something in a hurry. One of the remedies was stabbing.

### STABBING.

There were worse things than stabbing. If they stabbed the cow they would, of course, spoil the hide, and perhaps not save the cow. Therefore if the hide was considered more valuable than the cow he would hesitate about stabbing. If, however, they thought that stabbing was going to save the cow the method of procedure was most simple. If stabbing became necessary there should be no delay; the sooner done the better. There was a special instrument for that work; it consisted simply of a wooden handle and dagger fitted in a tube, which should be inserted into the paunch. The dagger should then be pulled out and the tube left in. Where should they stab her? The answer was on the left-hand side. Why? Because the swelling on the right-hand side was pushing the small bowels into range of the proposed incision, and there would be little hope of a desirable recovery. On the left there was about 2ft. of space in which they could work with safety; it could do no harm and might do a lot of good. Putting a hand on the shoulder of the animal they should drive the instrument downwards with a turning movement in so doing. They would then move the instrument backwards and forwards, and on pulling it out there would be a rush of gas. If they held a naked light out from the cow the gas would give them 2ft. or 3ft. of blue flame. That gas represented the gas generated from carbide mixed with other inflammable gas. Having allowed all the gas to escape they would then pull out the tube and dab tar on the wound and the cow would be well again in a few days if they did not let her overfeed herself on the greenfeed again. If they did not possess a special instrument he suggested the use of a pocket knife or carving knife. An ordinary pocket knife blade would suffice if sharp enough. Having driven that pocket knife blade into the same position, and as directed in using the special instrument, they should give it a half turn and leave it in the cow. That would prevent the gas from getting in between the paunch and the skin. Giving the knife a half turn and keeping it in would keep the two holes together and thus enable the gas to escape freely. If the gas got between the skin and the paunch the cow would take a longer time to recover. Personally he would use a carving knife in preference to a dull-bladed ordinary knife. An inch cut was all that was necessary to allow the free exit of the gas. A rubber or lead tube would take the place of the tube as used in connection with the special instrument. Stabbing was a method of extreme urgency; there were half a dozen other things they would do without making a hole in the skin, but stabbing was first and foremost as a preventive measure if they had to turn their cows on to lucerne.

## OTHER METHODS.

Another method of treatment was to tar a bit of thick rope, say, 2in., or wood of the same diameter; place the tarred rope or wood across the mouth and fasten it on to the horns with sufficiently strong string to prevent the cow from getting it out of its mouth. Her efforts to do that would cause her to slobber profusely, and the wind would be belched up with immediate relief. The mouth being kept open and the tar being obnoxious caused her to chew vigorously, and thus a large amount of saliva would be produced. Perhaps the cow would not seem bad enough for gagging in that way. Perhaps she was accustomed to blow up regularly after feeding, and if she seemed uncomfortable there were half a dozen things they could do. A dab of Stockholm tar on her nose or along her tongue was an effective method of relief in such cases. A tablespoonful of mustard would answer the same purpose, or some baking soda on the back of her tongue, or a handful of ordinary common salt. If they found these remedies were slow in acting a quicker result could be obtained by pouring into the mouth 2ozs. or 3ozs. of photographer's hyposulphite mixed with warm water and used as a drench. If hyposulphite were not available some form of ammonia would do. Baking ammonia or carbonate, say, a teaspoonful mixed with honey or molasses and put into the mouth would give quick relief. Scrubbing ammonia used in the same way would also prove effective. Burning feathers under her nose would also answer the purpose, inasmuch as they were productive of ammonia so treated. Sulphur burnt under the cow's nose would also give relief. Failing that a handful of wood ashes or charcoal (the latter ground up) and mixed with a little milk would speedily cause an absorption of the gas in the inside. With any of those methods taken in time there was every chance of saving the cow, and he urged them not to hesitate if she was blowing. If on the other hand she only became blown slightly after each meal they should give her something to keep her bowels open. For that purpose ¾lb. of Glauber's salts, which were sulphate of soda, or Epsom salts, dissolved in warm water, would give relief in 12 hours. If the cow was inclined to gripe they should put something warming with the salts, say, a teaspoonful or tablespoonful of ginger, some mustard, pepper, or peppermint, and the gripe would be lessened. Roughage, such as neglected lucerne, the fibrous material from the lucerne, was not easily macerated in the paunch. The purgative did not at times shift this material, and if that was the trouble they should administer nux vomica in tincture form, say, 10 to 12 drops, perhaps twice a day for a few days. With that treatment she would chew her cud more regularly, and they would see the dew on her nose and the brightness in her eye which would indicate that she was feeling decidedly better.

## DRY BIBLE.

Dealing with dry bible, Mr. Place said that if dry cows were turned out on the back country with nothing but thin stubble and a plentiful supply of sand they would naturally get considerably dry in their insides. It paid dairymen to put their dry stock on moderately good feed, and if they did that there would not be much talk of dry bible. Like most common ailments it covered a lot of conditions, and acute indigestion undoubtedly gave the name to the disease. In that state they would find the food in the third stomach as dry as dust and as hard as slate and of that color. They would find the food had only gone a little way in and then out again, and through the bowels. There would be traces of acute indigestion, congestion, and inflammation. That was a deficiency disease, and it would be the same if they were up to their necks in stubble. Stubble might be very good when first stripped, but if left standing for some weeks it was useless. It soon became like tubes of thin blown glass. All nutriment would be bleached out by the sun and only the siliceous matter in the straw remained. Acres and acres of this class of feed would only represent starvation.

## ANEMIA.

He came now to another class of disease—the cow form of anemia. They could discover when the animal was anemic by a bluish glaze cast across the eyes and the turning up of the whitish scum over the eye. The cloudiness was caused through poor circulation of the smaller vessels in the front of the eye which could not properly nourish it. That was aggravated with the visits of flies, such as the ordinary house fly, biting stable fly, and March fly; and, on the edge of the river farms, of mosquitoes, gnats, and so forth. A cow affected in that way would lose her normal condition and go down. Treatment at that stage was not very satisfactory. At first the cow's shoulders seemed tender in walking, and her eyes were affected. A few doses of quinine, say, a teaspoonful or from 30 to 40 grains, with molasses, or something similar given as a drench twice a day was an effective remedy. The third form of dry bible, said to be caused through eating the eggs of worms, caused weakness and loss of condition and general scouring. They would do well to give the cow first of all a purgative dose of salts, and then nux vomica and iron, and sulphate of iron was the most valuable and cheapest form in which they could give it Half an ounce of sulphate of iron given with meals or simply with warm water once or twice a day when the cow was in that condition would soon make her better. Then came the question of differentiation of these three forms of dry bible, and the remedies to use: It was quite easy, and there was no harm in mixing all the drugs. Most cow doctoring was of the "hit and miss" variety. They could use all the drugs at once, and they would do no harm and perhaps obtain a good result. The probable doses required would be two a day, or perhaps three, for several days.

## RED WATER.

Connected with the second form of dry bible was red water. He was given to understand they were not troubled with that in their district; higher up and lower down the Murray they were troubled with it. The symptoms reveal that the cow went off color. She ceased to chew her cud as usual, her bowels were bound up, appetite went, and she seemed uncomfortable in passing her water, which was tinged. It could be most simply described as darker than ordinarily. In a day or two it became blood-tinged, and in a few days quite red. She would grind her teeth, her eyes sunk into her head, and she went down.

At that stage it would be just as well to make a post-mortem. For treatment in the earlier stages Mr. Place recommended iron and quinine when the water was colored. In two or three days she should be well again. That form of red water was closely connected with the failure of the liver to do its work, which was the accompaniment of other forms of dry bible. They would find the gall bag contained very much more than it should, and varying from inky blackness to golden yellow. Of course they were aware it should be a greenish yellow. There would be a condition of friable liver in which a man's finger could sink into it. The kidneys were also affected. They became inflamed, dark, and full of blood.

### MAMMITIS.

Unfortunately they would experience more than one or two cases of mammitis. For two reasons—one was through germs that the cow picked up, and that form was contagious, and the other eventuated on account of the fact that a large number of dairymen were new at the business, and possibly had gone into it with the idea of having a milking machine on four legs which only had to be placed in the bail to squirt the milk down. They should realise they were dealing with a very complex organ. The cow in its wild state produced very little milk. She might remain in milk for three or four months, but after the first month she would give very little. Such a cow was of very little use, and, therefore, they bred an animal that would give large quantities of milk for a very long time. Now that was a totally unnatural condition for the cow, but it was one necessary for her and for the dairyman and others. Mammitis in another form might be caused through an injury to the udder. Sometimes a man's boot came in contact with the udder and that caused a form of mammitis. Sudden change in the weather or the drop in the temperature in the early morning was another cause. The cow's udder was becoming functionally active at the time, and the cold had the same effect upon it as upon the fingers and toes of human beings. It caused a congested condition of the blood of the udder. It was a most common cause of the trouble.

Contagious mammitis was caused by one of those ever present germs which sometimes entered a cow's udder through the teat or duct through the cow lying on the ground. It also entered the blood which circulated through the cow's udder. They could guard against the entry of those germs into the udder by looking after the cows and keeping them clean. They should not milk the cows on to the ground but into the pail. If they did that another cow might become infected through standing and stamping in the stall, and perhaps lying down in it. When they found a quarter was bad they should not hesitate in their treatment. They would notice that the symptoms were practically the same as in other forms. The bad quarter would become hard, especially the teat, and a little knob would appear on the root of the teat. The duct would feel hard and corish in the hand; the quarter would get hot and swell; the milk would get curdly and cheesy; it would smell like high cheese, because all the germs were in the udder—they were actually cheese-making. Fermentation was going on in the milk produced in that quarter. If they experienced the trouble in a contagious form they would find more than one cow affected with it, or showing symptoms at intervals of a few days.

Regarding the treatment, Mr. Place urged his hearers to treat every case as if possibly contagious. Contagion implied isolation. If there was a possibility of doing so they should turn the cow and her calf out from the rest and leave them to fight it out between them. One very important point in connection with isolation was that they handle her only after having finished with the other cows, and use no material that they used for the rest. He instanced a case where a dairyman had been treating and isolating the cows infected, but had been using the same material on the healthy cows. That, of course, was useless. He was really carrying out an inoculation experiment. They should not milk her on to the ground or into a bucket used for other cows, and the milk should be buried with a little lime. The germs would not survive that treatment. It should not be thrown on to the dung heap where the flies and fowls would root it up and infect the land. Elbow grease was an essential factor in the successful treatment of the cow. Hot soapsuds should be rubbed into the udder and photographer's hyposulphite given as a drench for two or three days. The soap should be shredded into hot water. That and elbow grease made a fine embrocation. The cow's udder should be rubbed perfectly dry with a branbag. If she was allowed to go out wet with the udder in that delicate condition through the rubbing she would come in worse than she went out. They should relieve the bad quarter when it seems too full of milk. They would probably have a teat syphon recommended to them. That syphon was of very little use unless for the purpose of injecting material into the udder. The idea of doing that was to kill the germs. Any antiseptic solution was suitable for that.

There were a number of things they could squirt into the udder. A 3 per cent. or 4 per cent. solution of boracic acid, say, 4ozs. or 5ozs., was good. A big pinch into a teacup of warm water, allowed to dissolve, injected into the udder was effective. That should be repeated on the third day, and on the third day after that. Such injections would bring the quarter back into use. Some people held that that treatment was no good. In many cases it was not. Perchloride of mercury was a most useful remedy; it was used in a very high dilution, and obtainable in tabloid form, one of which would give a strength of one in 1,000 dissolved in a pint of water, or one in 2,000 dissolved in two pints. No metal should come in contact with that drug. Glass syringe, enamel, or earthenware should be used. Half a teacupful should be injected into the udder, or a teacupful in bad cases. One or two injections of that sort would have a very beneficial effect, and they could assist that treatment by rubbing in blue ointment twice a day. Blue ointment consisted of equal parts of mercury and lard.

In cases where the quarter was absolutely rotten it was just as well to conduct a post mortem. They could, however, give the cow a good deal of relief by mixing equal parts of alcohol in the form of methylated spirits and glycerine, and rubbing the teats thoroughly with the mixture. They should also use phytolacca if procurable. Twenty drops mixed in molasses or a half a teacupful of soapsuds given three times a day would save bad cases sometimes. Indications of hopeless cases were discharge at the nose, constipation of the bowels, general weakness, and inability to rise. She should be shifted to that position in which her blood circulated properly. He believed that if the cow was not left to lie in the position in which the blood flowed into the large organs, and given a little green stuff and some hot gruel in milk, she would probably get up on her legs and be ready for treatment.

### MILK FEVER.

Speaking of milk fever, Mr. Place said they would notice the symptoms in the cow paddling with her hind legs as if she wanted to pass water, and could not do it. In a few hours she would be off her legs, head thrown round the side, eyes closed, snoring, and looking almost dead. Years ago about 80 per cent. of the cows that went down in that way never got up again. Even now 30 per cent. survived in spite of the faulty treatment they received. A Dane formed the theory of injecting antiseptic solution into the cow's udder that would not damage the cells. That was iodide of potassium. He would strip out all the milk and inject that into the bad quarter From 70 per cent. to 75 per cent. of his cases were a success. An Austrian found himself without iodine of potassium, and pumped in air. Following out the theory formed by the Austrian as the result of pumping air into the udder, he held that where there was prolonged difficulty in calving, milk fever was seldom seen, as that gave time for the equalisation of the blood pressure. Personally, Mr. Place advised injections without stripping. If they followed that out they should fill the udder to the distention of a cow in healthy milking condition, and prop her up on her breast. With regard to the apparatus for injecting, the teat syphon was quite sufficient. Surgical dealers would sell them milk fever outfits, and recommend them to fill the four quarters simultaneously. If it were a case of rush, a clean quill, attached to a bicycle pump, and so arranged that there would be no leakage of air, would suffice. He did not recommend it in preference to the outfit, but only if the outfit were not available. In a great majority of cases injections proved a success, and in a few hours the cow would get up. Then they should treat her reasonably, giving her a little to eat. They should not overdo it. If the material used on the cow was dirty, then a form of inflammation might set up, and cause a lot of trouble.

### QUESTIONS ANSWERED

In reply to a question, Mr. Place said old neglected lucerne was a cause of dry bible. He did not mean old healthy lucerne. It was hard to digest, and the moulds caused irritation of the paunch.

About the only certain way of diagnosing a case of sand was by the cow passing it. It was a mere matter of guesswork, however. If the cow had been on sand-producing country and small herbage, and showed signs of trouble, they could then assume it was sand. It was almost useless to attempt to shift the sand by means of purgatives, because the sand was in the paunch. The only way was to tone the cow up with vegetable, such as nux vomica, and also molasses.

Asked how to cure ordinary cow pox on the udder, Mr. Place suggested boracic acid or castor oil mixed in equal parts with ordinary oak varnish. After dressing the teats with ointment (carbolised vaseline was suitable), they would paint on.

The main symptom of colic was the cow's endeavor to relieve the pain by kicking at herself, and very often trotting around in a silly kind of way. Such behaviour would lead one to believe that there was muscular contraction of the bowels. When they noticed those indications of pain they should give the cow something to warm her inside. Ginger, mustard, or something similar could be used.

Mr. Place stated that the slipping of calves was often a contagious disease, but fortunately it could be kept well under control. There was a preventive serum that could be used with some success.

# ADVISORY BOARD OF AGRICULTURE.

The monthly meeting of the Advisory Board of Agriculture was held on March 14th, there being present Messrs. G. R. Laffer (in the chair), A. M. Dawkins, T. H. Williams, C. J. Tuckwell, Col. Rowell, Professor Perkins, and the Acting Secretary (Mr. H. J. Finnis). Apologies were received for the absence of Messrs. F. Coleman and J. Miller.

### CONFERENCE OF DAIRY FACTORIES.

A subcommittee, consisting of Professor Perkins and Messrs. C. J. Tuckwell and A. M. Dawkins, was appointed to undertake arrangements for the Conference of Dairy Factory Representatives.

### WOMEN'S BRANCHES OF THE AGRICULTURAL BUREAU.

The following report was received from the subcommittee appointed to deal with this question:—

Your committee has met and given due consideration to the question of banding together for a common purpose women interested in agricultural matters. Your committee approves of the proposal, and whilst recognising that no locality in the State should ultimately be shut out from the benefits of the scheme, suggests that the earlier Branches should be formed in the immediate neighborhood of existing Branches of the Agricultural Bureau, and as much as possible with the concurrence and help of members of these Branches. In this connection your committee submits for your approval the following recommendations:—

1. The association of the women of South Australia interested in agricultural matters, under the auspices of the Advisory Board of Agriculture, wherever conditions permit of it.
2. The adoption of the name of Women's Branches of the Agricultural Bureau in preference to Women's Clubs.

3. The membership of Women's Branches of the Agricultural Bureau to be confined to women alone.

4. By mutual consent, and for a common purpose, joint meetings of both women's and men's Branches of the Agricultural Bureau may be held in the same locality.

5. Women's Branches of the Agricultural Bureau would be governed by the same rules as the men's Branches, and would participate in the same privileges.

6. As soon as a sufficient number of Women's Branches have been formed, it is recommended that the Minister of Agriculture be asked to direct that the columns of the *Journal of Agriculture* be thrown open to questions of domestic economy and matters in which women are specially interested.

### NOXIOUS WEEDS LEGISLATION.

From the Conference of Lower North Branches was received a resolution to the effect that the Government should be requested to see that district councils carried out the provisions of the Noxious Weeds Act more strictly. It was decided to forward the resolution to the Minister of Agriculture, and draw attention to the previous recommendations of the Board in connection with this matter.

### STANDARD FRUIT CASE.

The same conference also recommended that the standard fruit case regulations should be so altered as to make the provisions applicable to the metropolitan area only. The Board could not see its way to support this proposal.

### WEST COAST TRANSPORT FACILITIES.

The conference of Upper Eyre's Peninsula Branches forwarded a resolution in support of the request of the Lower Eyre's Peninsula Branches Conference, in favor of the provision of better transport facilities between the mainland and the West Coast. This was referred to the Minister of Agriculture in support of the Board's previous recommendations.

### WHARFAGE RATES.

The Upper Eyre's Peninsula Branches Conference urged that the Board should request the Harbors Board to give to all ports in South Australia the same rates of wharfage, and similar facilities to those ruling on the River Murray, where the wharfage rates were on every 5gall. can of milk or cream 1d., 10gall. 2d.; on every parcel of 14lbs. or under, 1d. These charges, in the case of milk and cream, covered the inward and outward dues on shipping and landing, and were met by the affixing to the package of a jetty toll stamp. It was decided to strongly recommend action in the direction suggested.

### LIFE MEMBERSHIP.

On the recommendation of the Ramco Branch, the name of Mr. F. G. Rogers was added to the list of life members of the Agricultural Bureau.

### NEW MEMBERS.

Forty-four names were added to the rolls of existing Branches.

# ROSEWORTHY AGRICULTURAL COLLEGE.

## SPEECH DAY.

On Friday, March 30th, the annual speech day celebrations were held at the Roseworthy Agricultural College. The chair was occupied by the Minister of Agriculture (Hon. C. Goode). After the National Anthem had been sung, the Principal of the College (Mr. W. J. Colebatch) presented his report, which was heartily approved. He said:—

### The Principal's Report.

To-day brings to a close the thirty-second scholastic year of Roseworthy College. Since the institution was established 633 students have passed through its doors, and of these 234, or 38.39 per cent., have carried off the college diploma. These figures may be viewed with a certain degree of satisfaction, and I believe there are few public men who would deny the past students of this college the right to claim a share in the dissemination of agricultural knowledge and the institution of improved farming modes and practices throughout our State. Nevertheless, I recognise that the College would not be performing its true function were the facts otherwise. In order that it may discharge in a full measure its obligations to the community, a technical college such as this should extend its sphere of influence in an ever-widening circle through the medium of its past students, both graduates and non-graduates. Let it be clearly understood, however, that I am far from subscribing to the opinion that these young men on leaving college would be wise to regard themselves as agricultural missionaries, ordained to carry the torchlight of agricultural progress to their less fortunate brothers on the land. Whether or not they will ultimately help to improve the system of rural production in vogue in their respective districts is a matter that is less dependent upon their scientific knowledge than upon their inherent capacity to apply the education acquired here to the every-day problems of the farm.

### Education the Greatest Need.

It cannot be too often impressed upon the young men as they venture forth from the college with a full store of scientific principles and a minimum of responsibility, that their greatest need is still education, and that if they are well advised, they will occupy themselves largely during the early period of their post-graduate careers in absorbing the valuable knowledge, empirical though it be, which has been hard won in the school of experience by men of riper years. It is recorded of Lord Bacon that, being interested in agriculture, he gathered together the best books of his day touching upon the subject, and when he had perused them, he ordered his servant to remove them all into the garden and burn them, for the reason that they dealt with agricultural practices instead of agricultural principles. Obviously it would simplify the question of agricultural education if it were possible to conform to the high standard set up by this famous philosopher, but unfortunately we are still forced to admit that modern agriculture is essentially a combination of science and art. The art or practice of agriculture is an indefinite subject with innumerable ramifications, which render it unusually complex and difficult to comprehend. This phase of agriculture can only be thoroughly grasped in so far as it concerns the character of man's particular environment, and then only after many years of actual personal experience. (Hear, hear.)

### PRINCIPLES AND PRACTICE.

It is clear, therefore, that in the brief space of an agricultural college designed for young lads between 15 and 20 years of age, there can be no room for an exhaustive course on the art of agriculture in the broadest acceptation of the term. There is, however, at this stage in the agricultural development of the State a very pressing demand for young men properly trained in the arts or practices that obtain throughout the temperate regions of the Commonwealth, as well as in agricultural science. At Roseworthy College the importance of skill in the practical operations of a farm has always been stressed hitherto, and in my view this is unquestionably the proper policy to pursue. This does not imply that the inculcation of agricultural science at Roseworthy is relegated to a position of secondary importance. On the contrary, I concur with those who hold that more time might well be devoted at agricultural colleges to the study of the contributing sciences, and their relationship with agriculture. Indeed, I am keenly desirous, so soon as a favorable opportunity presents itself, of duplicating the present block of science rooms, so that the curriculum may be expanded in the direction of agricultural botany, economic mycology, agricultural zoology, economic parasitology, veterinary science, and allied subjects. This will entail a certain outlay of public money, but the attitude of public men to-day towards education is liberal, and I have therefore every confidence that when the piping days of peace return to us, and a project such as this, which aims at improving the standard of agricultural education in every important particular, will not be rejected for economic reasons. Of all the avenues of expenditure of public money, one of the last to be obstructed should be that which leads towards the development of agricultural education and rural prosperity. In this connection, I may be permitted to draw your attention to the fact that it is essential to have a knowledge of the principles underlying agricultural practices, in order to understand them and be in a position to adapt, modify, and develop them along rational lines, as circumstances may suggest.

### THE TRAINED FARMER.

Those who are wont to indulge in crystal gazing in the hope of divining a royal road to success for the man on the land will probably be unanimous in the opinion that if the business of farming in Australia is to continue to be a prosperous avocation, it must attract to it young men who are equipped with a sound agricultural education. (Hear, hear.) Nevertheless, there is no calling in life in regard to which the need for preparatory training in study is held in such low estimation. It is frequently stated that we are living in the age of the specialist, and yet the business of rural production, which will tax the ingenuities of the most versatile individual, is freely engaged upon by men who are wholly untutored, both in the art and the science of farming. There are approximately 40,000 men, or one-fifth of the total male population of the State, directly concerned in the raising of primary products in our State, and the number of young lads between 15 and 25 years of age, is over 25,000; and yet, notwithstanding the facilities offered by successive Governments for land settlement, the percentage of young lads above the minimum age who seek an agricultural education at Roseworthy College is less than one-tenth per cent. This is much too low for a State that is largely dependent upon agriculture, and I venture to express a hope that in the halcyon days of the future the benefits conferred by the State Agricultural College upon those who elected to take the prescribed course of instruction will become more widely known and appreciated. (Hear, hear.)

## The Classification of Cereals.

Turning from the general question of agricultural education to the events that have transpired at this College during the past year, I wish, in the first place, to emphasise the value of the work undertaken in connection with the collation, classification, and identification of cereals. Starting from a small nucleus of varieties, we have now close upon a thousand different named types in the cereal catalogue, and by means of botanical and agricultural characters, it is hoped to reduce this chaotic assemblage to an orderly arrangement of types, and thus dispel the general confusion of thought that enshrouds the subject of cereal varieties at the present time. This, to me, is a most useful piece of work, and it should lead ultimately to the establishment of an official Cereal Register, and a uniform system of nomenclature, both of which will simplify and facilitate the tasks of the plant breeder and cereal specialist. (Hear, hear.) The only change in the personnel of the staff during the year has resulted from war conditions. Mr. E. G. Stephens, B.Sc., the assistant chemist, has arrived in England in connection with munition laboratory work, and his place has recently been filled by the appointment of Mr. L. Hodgson. (Applause.)

## Students and Soldiers.

We are proud to recall that since the outbreak of war 150 of our old students have rallied to the colors. (Applause.) Seventeen of them are commissioned officers, and many others have qualified for similar promotion from the ranks. With so many brave fellows representing their old college amid the dangers of the battle front, we cannot hope to escape wholly from the saddening consequences of warfare, and it is one of our most painful duties to-day to record the loss of those of our lads who have paid the full cost of their whole-hearted devotion to the British Empire. The names of those who have been reported killed during the past year are L. G. Morrison, F. Inglis, F. F. Berry, J. A. B. Stevenson, and K. B. Gordon. Of those who have been through the turmoil of battle and have been spared to enjoy the rewards of their meritorious services, there are two whose deeds have won for them the coveted Military Cross. Captain J. S. Malpas, Gold Medallist in 1909, was awarded the distinction "for conspicuous gallantry in action." A similar military decoration was won by Captain J. L. Sandford, who was a student here during 1905 and 1906. In the department of learning we take pleasure in congratulating Mr. Cyril F. Stephens on gaining the B.Sc. degree in agriculture at the Adelaide University. Mr. Stephens and also Mr. F. H. Dealy, who has almost completed his degree course in agricultural science, are also to be commended for their action in joining the Expeditionary Forces at the conclusion of their studies. (Applause.) In this connection I should mention also Mr. F. E. Watson, M.A., B.Sc., who recently returned from the Edinburgh University, and is now in the ranks of the Australian Engineers. (Applause.)

### New Record Established.

Finally, we have to review the scholastic records of our present students. The young men who are leaving us to-day, have passed through some strenuous times since they enrolled as students. Although we have had two extraordinary heavy harvests to cope with, and being low in man strength, the senior class of 1916-17 has been afforded exceptional opportunities of acquiring manual skill in farming operations. (Laughter.) That they have stood well up to the collar throughout is significant of an earnest desire to qualify themselves for the college diploma. Although in a sense they have experienced relatively hard times, yet they have also enjoyed certain privileges which will leave a lasting impression on their memories. I refer to the shearing trip at Concordia, and the excursion to Mount Crawford. (Applause.) Mr. Murray's generosity to Roseworthy College and its students is well known and very highly appreciated, and it is with pleasure that I received his permission to have one of his portraits hung in the College. I take this opportunity also of pointing out that we have now on the wall of this room a complete set of portraits of the former principals of this institution from its inception in 1883. The diploma results of 1916-17 have established a new record, and one for which those responsible deserve our heartiest congratulations. Their diploma average works out at 80.17 per cent., whereas the previous record is 75.72 per cent., gained in the year 1909. These results are remarkably even, less than 2½ per cent. separating the extremes. (Applause.) The gold medallist of the year—Mr. Frank Riggs—has earned 81.7 per cent. of the available marks, Mr. Gordon Sweeney has gained 80.12 per cent., and Mr. W. H. Lewcock 80.05 per cent. These three have thus secured first-class diplomas, and Mr. Victor O'Grady, with 79.67 per cent., and Mr. Kenneth Catt, with 79.33 per cent., have gained diplomas of the second class. (Applause.) To these young men I extend, on behalf of the College, our heartfelt wishes for their future prosperity and success. We look to them to bring yet more honor and renown to their old College by their future actions and conduct. In conclusion, I wish to proffer our sincere thanks to those who have so kindly contributed prizes and medals for competition among our students.

### THE MINISTER'S TRIBUTE.

The Minister of Agriculture, in a comprehensive address, referred eulogistically to Mr. Colebatch's capabilities and success as principal. He had heard with satisfaction the principal's opinion that any reasonable expenditure on rural education and development was fully justified. He hoped shortly to be able to announce the inauguration of a vigorous policy of agricultural expansion and land development generally.

### AGRICULTURAL EXPANSION.

It was essential that the State should be prepared to continue expenditure on the stimulation and promotion of production, in order that it might be able to overtake the huge financial burdens that were piling up. In regard to the settlement of unoccupied Crown lands, the practice of sending men out into the mallee to battle unaided against the great difficulties of pioneering must be altered. He trusted to be able to secure legislative authority to have such lands cleared in advancement of occupation—by that he meant 200 or 300 acres thoroughly and absolutely cleared, so that the new settler would then have every chance of obtaining a satisfactory crop each season, and go ahead with his operations. It was intended to continue the reclamation of the Murray swamp lands as rapidly as possession could be obtained, and go on with the irrigation of the high lands. That progressive policy must also be extended to the South-East, where there were many thousands of acres of fertile country requiring only efficient drainage to enable it to become highly productive. He looked forward to the time when stockraising would be conducted in the South-East on a much larger scale than at present. One of the greatest problems which the State had to face was represented by the recurring droughts. He urged the farmers to make provision in the good years for the lean periods. The Government had determined to set the community an example in that respect by the conservation of a national fodder reserve, which would render it possible to tide some of the more valuable stock over times of great stress. For that purpose lucerne would be grown on reclaimed swamp lands along the Murray, which, owing to their inaccesible nature, could not be settled in the ordinary way. (Applause.)

Mr. R. H. Crawford (President of the Royal Agricultural Society), Mr. G. Jeffrey (Vice-Chairman of the Advisory Board of Agriculture), Professor Perkins (Director of Agriculture), Mr. A. J. Murray, the Hon. W. Hannaford, M.L.C., and Mr. Hague, M.P., also spoke.

### DIPLOMAS AND PRIZES.

Mrs. John Warren then distributed the trophies and prizes.

*In Order of Merit.*

Diplomas of the First Class.—Frank Riggs, with honors in agriculture, dairying, bookkeeping, aviculture, and œnology; Gordon Sweeney, with honors in viticulture, surveying, and aviculture; William Hartley Lewcock, with honors in viticulture, fruit culture, and aviculture.

Diplomas of the Second Class.—Kenneth Clifford Catt, with honors in surveying; Victor Thomas O'Grady, with honors in bookkeeping and œnology.

### *Prize List—Third Year Students.*

Gold Medal (presented by the Royal Agricultural and Horticultural Society for the highest aggregate in all diploma subjects), Frank Riggs.

College second prize, Gordon Sweeney.

Old Students' Cup (presented by the Agricultural College Old Students' Association for the highest aggregate in agriculture and veterinary science), Frank Riggs.

Viticulture (presented by Mr. R. H. Martin), William Hartley Lewcock.

Fruit Culture (presented by Mr. George Quinn), William Hartley Lewcock.

Oenology (presented by the South Australian Vinegrowers' Association), Victor Thomas O'Grady.

Chemistry (presented by Mr. J. H. Phillips, B.Sc.), Victor Thomas O'Grady.

Veterinary Science (presented by Mr. F. E. Place, M.R.C.V.S., B.V.Sc.), William Hartley Lewcock.

Practical Examination (presented by the members of the Advisory Board of Agriculture), William Hartley Lewcock.

Outside Work (presented by the Albert Molineux Memorial Trust), Frank Riggs.

Ploughing (presented by Professor Perkins), Francis Foster Cobham.

Special Prize for Study of Farm Seeds and Grains (presented by Mr. Charles Whiting), Gordon Sweeney.

Special Prize for Surveying (presented by Mr. H. C. Pritchard), Kenneth Clifford Catt.

Special Prize for Sheep Dressing (presented by Mr. R. C. Scott), William Hartley Lewcock.

### *Second Year Students.*

Silver Medal (presented by the Albert Molineux Memorial Trust), Cecil Joseph Ricenorth.

College Second Prize, Oswald Bowden.

Agriculture and Farm Diaries (presented by the Principal), Cecil Joseph Ricenorth.

Viticulture (presented by Mr. H. Buring), Cecil Joseph Ricenorth.

Fruit Culture (presented by Mr. H. E. Laffer), Cecil Joseph Ricenorth.

Veterinary Science (presented by the Principal), Cecil Joseph Ricenorth.

Agricultural Botany (presented by Mr. A. J. Adams, M.A.), John Omagh Robinson.

Outside Work (presented by the Albert Molineux Memorial Trust), John Omagh Robinson.

### *First Year Students.*

Silver Medal (presented by Mr. A. L. Brunkhorst), Harry Kingsley Lewcock.

College Second Prize, Harry Ronald Haselgrove.

Agriculture and Farm Diaries (presented by the Principal), Harry Ronald Haselgrove and Harry Kingsley Lewcock (equal).

Botany (presented by Mr. A. J. Adams, M.A.), Harry Kingsley Lewcock.

Outside Work (presented by the Albert Molineux Memorial Trust), David Haynes Preston.

At the instance of Mr. Colebatch the Minister and Mrs. Warren were accorded an enthusiastic vote of thanks, after which the National Anthem was again sung. Prior to leaving the College the visitors were entertained at morning tea by the staff.

## GUMMING OF APRICOT TREES.

In a communication addressed to a fruitgrower who had sought information in reference to the gumming of young apricot trees from exposed wounds, and its relation to the time at which the pruning was done, the Horticultural Instructor (Mr. Geo. Quinn) offers some suggestions of considerable importance. "'Gum' of this nature," said Mr. Quinn, "is simply sap which has been exposed and congealed or changed by contact with external agencies. Frequently, however, the change is made in stone fruits through the agency of fungi which have gained an entrance *via* wounds of a greater or lesser extent or even by means of the buds which are less able to resist than the more solid bark. The exudation *via* wounds made by pruning is increased when the pruning is performed at a time when the sap is still slightly liquid, but not actively flowing, as it is when the tree is making or sustaining foliage. One cannot say that early, medium, or late pruning after the leaves have fallen will give rise to it in any given season, for the simple reason that in our climate the solidifying of the sap is scarcely completed some years before it begins to liquefy again. In cold, dry winters the tree either goes more completely to rest, and the solidification of the sap is more complete, or the closing up of the channels at the cuts is more rapidly attained by natural processes of cauterization (drying).

"In a year like the present, the peeled-off bark, especially on young trees, even at midwinter reveals a moisture to the touch in the sap layers, and when the weather is consistently wet, so that the cut ends do not dry up, this sap is bound to exude and congeal into gum. Unless wound fungi find a lodgment on these cut ends the gum will solidify as soon as the weather turns dry and form a sort of natural plaster.

"In respect to artificial dressings to prevent injury, grafting waxes will not as a rule adhere to moist surfaces. The best suggestion I can make is to spray or paint the cuts with a strong fungicide such as Bordeaux mixture. This will disinfect the wounds and keep out decay-producing organisms until the healing tissue is drawn over the wounds by the action of the tree's growth. I may say in a general sense I believe the very prevalent decline of our apricot trees will be found to have been hastened by the heavy prunings of winter having made bad wounds which have admitted decay into the fibrous tissues of the limbs and trunks of the trees, thus lowering their vitality, although externally there is little evidence to this effect at the time. When a severe strain such as the protracted drought of recent years has imposed upon the trees' powers this lowered vitality must prove an important factor in deciding whether they shall live or die.

"I believe, if it is possible to initiate a system whereby the making of these large wounds can be avoided, and the energies of the tree in building up its permanent structure be directed into the desired channels during the growing season, much will be achieved towards increasing the tree's chances of sustaining a long life. As an indication to the practical application of this theory I suggest several summer manipulations in the form of disbudding surplus shoots, even to complete suppression, whilst others more suitably placed have their terminal points pinched out to cause them to subdivide into growths needed for framing the tree, or maintaining a supply of fruit-bearing shoots.''

## DAIRY AND FARM PRODUCE MARKETS.

A. W. Sandford & Co., Limited, report on April 1st:—

Butter.—The comparatively cool weather experienced during March has contributed to the production of butter being very well maintained, so that with the rains experienced the prospects of another grass season at present appear good. This State still has a surplus of second and third qualities which continue to find their way to the London market, though values there eased considerably towards the end of the month. With a shortage of tops, for which South Australia has to look to the eastern States, prices at the close of the month in prints were:—''Alfa,'' 1s. 6½d. per lb.; ''Primus,'' 1s. 6d.; third grade creamery, 1s. 2½d. to 1s. 3½d.; choice separators and dairies, 1s. 4d. to 1s. 5½d.; fair quality, 1s. 2½d. to 1s. 3½d.; well-graded store and collectors', 1s. 1d. to 1s. 2½d.; off-conditioned lots, 1s. to 1s. 0½d. per lb.

Eggs.—The egg market, which had considerably firmed during February, eased sharply, values receding to 10½d. per dozen, but later recovered, and at the end of March hen sold at 1s.; duck, 1s. 1d. per dozen.

Cheese.—Considerable quantities are still coming forward, but the market was appreciably relieved by the first shipment being made for London on behalf of the Imperial Government. Values continue to hold at 8d. to 9d. per lb. for large to loaf.

Honey.—Stocks are very light, with export orders being refused; prime clear extracted selling at 4d. to 4½d. per lb; beeswax wanted at 1s. 6d. to 1s. 7d. per lb.

Almonds.—Purchasers are eager to secure their requirements, having in view that the crop this season is only small, so that values advanced, Brandis selling at 10½d. to 11d. per lb.; mixed softshells, 10d.. to 10½d.; hardshells, 5½d.; kernels, 1s. 8d. to 1s. 9d. per lb.

Bacon.—Supplies have considerably increased, and there is a small surplus, which is readily placed for export. Best factory-cured sides, 11d. to 1s. per lb.; hams, 1s. 1½d. to 1s. 2½d. per lb.

Live Poultry.—To a large attendance of buyers extensive catalogues were submitted, purchasers operating freely in anticipation of Easter trade, and good competition was experienced for birds fit to kill. Certainly there were some poor conditioned sorts, but for these the prices secured were very fair considering the quality. Good table roosters fetched 3s. to 4s. each; nice-conditioned cockerels, 1s. 9d. to 3s.; plump hens, 2s. to 3s.; light birds, 1s. 6d. to 2s.; ducks, 1s. 6d. to 3s. 6d.; geese, 5s. to 6s.; pigeons, 4d. to 6d. each; turkeys, from 6¾d. to 10½d. per lb. live weight for fattening to good table sorts.

Potatoes.—Locally grown potatoes continue to be very plentiful, and according to the supplies visible at present there should be no real necessity to import from other States for some months to come. Onions.—Buyers for export have ceased to operate on this market, and as there are good supplies available, demand is lifeless, and price is stationary. Quotations—Potatoes, £4 to £5 per ton on rails Mile End or Port Adelaide. Onions, £5 10s. to £6 per ton on rails Mile End or Port Adelaide.

# THE AGRICULTURAL OUTLOOK.

## REPORT FOR MONTH OF MARCH.

The following reports on the general agricultural condition and outlook of the areas represented by the Government Experimental Farms mentioned below have been prepared by the respective managers:—

*Booborowie.*—Weather—The weather for this month has been remarkably cool. The first fortnight was bright and warm, but was followed by cloudy, dull days, with light, misty showers. The mornings have been dewy, and the weather generally unseasonable. Crops.—The reaping has been finished, and the wheat carted, although much wheat remained unreaped until well into the month. The yields have been very satisfactory, showing the wonderful quality of the soil when given suitable conditions. Natural feed is very good. The rains have not been heavy enough to cause much grass to shoot as they have farther north. Stock is generally in good condition. Colic on some farms has caused deaths amongst the horse stock. Pests—Blowflies have caused trouble amongst the sheep, and threaten to cause loss unless means to combat them are used. Mice are doing much damage. Miscellaneous—The fallows are dirty in many instances, the result of summer rains.

*Eyre's Peninsula.*—Weather has been close and thundery varied by several cool spells. Light scattered rains fell during the middle of the month, and a good steady fall was registered towards the close. In all nearly 1in. was recorded, which is twice as much as the average for the past three seasons. This rain, combined with the rather calm conditions, was responsible for some comparatively poor scrub burns secured in the district. The soil is in nice condition for working, and farmers are commencing operations to secure as much land under crop as possible. Natural Feed.—Self-sown and natural feed is plentiful, in fact in as great a supply as it has ever been known to be. Pests—Mice are exceedingly plentiful, and are doing much harm to stores of hay and seed.

*Kybybolite.*—Weather—Generally cool and fine, with three light falls of rain towards the end of the month. Crops—Summer crops have matured to much better results than expected. Kale crops are excellent. This season's crops having been heavily stocked in some instances, the second year growth on the previous season's sowing is also carrying a lot of stock. This very valuable fodder is attracting more and more attention as its use is extending among farmers. Natural Feed—The new growth is unusually forward. Stock are generally in very good order and healthy. Miscellaneous—Feed oats have been sown in some instances, and farmers are pushing on with the work preparatory to seeding.

*Turretfield.*—Weather—March was a mild month from a weather point of view. No hot weather was experienced, and there were a number of cloudy days on which rain threatened. The rainfall for the month was 122 points. Of this total 38 points were registered in the middle of the month, the remainder falling during the last two days. Crops—Lucerne did not make any rapid growth during the month, owing probably to the cool weather conditions. Natural Feed—Grass that was started by the February rains has not come on much, owing to the absence of sufficient later rains. Farmers are resorting to hand feeding to keep stock in condition. Stock—As the fallow land had to be cultivated a number of times during the season, the working horses are not in a fat condition, but farmers are now resting their horses to get them fit for seeding operations. Dairy cattle are also falling off in their milk yields, as the rain has robbed the natural feed of much of its sustenance. Pests are numerous. Mice are causing farmers much anxiety, and holders of wheat are carting their grain as fast as they can, owing to the ravages of mice in the barns. Rats are also prevalent, and a few black rats and some white mice have been noticed. Starlings are more numerous than sparrows.

## RAINFALL TABLE.

The following figures, from data supplied by the Commonwealth Meteorological Department, show the rainfall for the month of and to the end of March, 1917, also the average precipitation to the end of March, and the average annual rainfall.

| Station. | For Mar., 1917. | To end Mar., 1917. | Av'ge. to end Mar. | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| **Far North and Upper North.** | | | | |
| Oodnadatta | 0·48 | 3·28 | 1·83 | 4·76 |
| Tarcoola | 0·40 | 4·19 | 1·35 | 7·58 |
| Hergott | 0·8 | 2·44 | 1·47 | 6·04 |
| Farina | 0·8 | 2·95 | 1·78 | 6·70 |
| Leigh's Creek | 0·27 | 4·86 | 1·96 | 8·66 |
| Beltana | 0·32 | 5·48 | 2·28 | 9·22 |
| Blinman | 0·26 | 3·94 | 2·77 | 12·83 |
| Hookina | 1·22 | 8·03 | — | — |
| Hawker | 0·88 | 7·65 | 1·65 | 12·22 |
| Wilson | 0·79 | 5·26 | 1·83 | 11·78 |
| Gordon | 0·65 | 7·57 | 1·79 | 10·26 |
| Quorn | 0·86 | 4·97 | 1·70 | 13·78 |
| Port Augusta | 0·70 | 3·48 | 1·75 | 9·46 |
| Port Augusta W. | 0·85 | 3·50 | 1·45 | 9·36 |
| Bruce | 0·85 | 4·76 | 1·71 | 10·01 |
| Hammond | 1·48 | 7·33 | 1·82 | 11·46 |
| Wilmington | 1·00 | 4·99 | 2·16 | 18·26 |
| Willowie | 0·87 | 6·00 | 1·90 | 11·90 |
| Melrose | 1·69 | 6·52 | 3·20 | 23·04 |
| Booleroo Centre | 1·18 | 5·85 | 1·99 | 15·83 |
| Port Germein | 1·16 | 4·05 | 1·82 | 12·84 |
| Wirrabara | 1·71 | 5·39 | 2·24 | 18·91 |
| Appila | 1·33 | 5·20 | 2·24 | 15·08 |
| Cradock | 0·57 | 6·14 | 1·77 | 10·86 |
| Carrieton | 0·80 | 7·10 | 1·78 | 12·22 |
| Johnburg | 0·41 | 5·68 | 1·49 | 10·21 |
| Eurelia | 0·68 | 6·95 | 1·90 | 13·24 |
| Orroroo | 0·50 | 6·47 | 2·27 | 13·42 |
| Black Rock | 0·46 | 6·22 | 1·99 | 12·25 |
| Petersburg | 0·51 | 6·94 | 2·04 | 13·07 |
| Yongala | 0·85 | 6·67 | 1·87 | 13·94 |
| **North-East.** | | | | |
| Ucolta | 0·41 | 6·14 | — | — |
| Nackara | 0·48 | 6·95 | — | — |
| Yunta | 0·41 | 6·58 | 1·72 | 8·22 |
| Waukaringa | 0·82 | 5·74 | 1·59 | 7·94 |
| Mannahill | 0·38 | 4·58 | 1·75 | 8·46 |
| Cockburn | 0·23 | 6·12 | 1·80 | 7·97 |
| Broken Hill, NSW | 0·58 | 7·34 | 2·23 | 9·63 |
| **Lower North.** | | | | |
| Port Pirie | 1·84 | 4·90 | 1·86 | 13·21 |
| Port Broughton | 1·14 | 2·85 | 1·85 | 14·33 |
| Bute | 1·14 | 3·58 | 1·79 | 15·42 |
| Laura | 1·47 | 4·64 | 2·20 | 18·22 |
| Caltowie | 1·74 | 4·28 | 2·17 | 17·27 |
| Jamestown | 1·66 | 4·25 | 2·15 | 17·46 |
| Gladstone | 1·49 | 4·40 | 1·94 | 16·00 |
| Crystal Brook | 2·11 | 4·07 | 1·89 | 15·62 |
| Georgetown | 1·65 | 4·98 | 2·24 | 18·32 |
| Narridy | 2·45 | 4·41 | 2·05 | 16·79 |
| Redhill | 1·58 | 4·34 | 2·90 | 16·79 |
| Spalding | 1·33 | 3·18 | 2·36 | 20·25 |
| **Lower North—*continued.*** | | | | |
| Gulnare | 1·63 | 4·11 | 2·12 | 19·74 |
| Bundaleer W. Wks. | 1·32 | 3·23 | 2·02 | 17·29 |
| Yacka | 1·41 | 3·62 | 1·77 | 15·27 |
| Koolunga | 1·50 | 4·53 | 1·99 | 15·94 |
| Snowtown | 1·06 | 3·80 | 1·85 | 15·70 |
| Brinkworth | 1·87 | 4·23 | 1·94 | 15·48 |
| Blyth | 1·36 | 3·65 | 2·01 | 16·34 |
| Clare | 2·22 | 5·11 | 2·77 | 24·30 |
| Mintaro Central | 2·07 | 5·16 | 2·29 | 21·99 |
| Watervale | 2·20 | 5·75 | 2·81 | 27·17 |
| Auburn | 1·83 | 5·15 | 3·02 | 24·25 |
| Hoyleton | 1·19 | 3·97 | 2·19 | 17·96 |
| Balaklava | 1·04 | 3·50 | 2·02 | 16·03 |
| Port Wakefield | 0·83 | 4·62 | 2·16 | 13·13 |
| Terowie | 0·65 | 5·04 | 2·10 | 13·71 |
| Yarcowie | 0·87 | 5·71 | 2·06 | 13·91 |
| Hallett | 0·82 | 2·94 | 1·97 | 16·40 |
| Mount Bryan | 0·97 | 2·98 | 1·92 | 15·73 |
| Burra | 0·86 | 2·51 | 2·39 | 17·82 |
| Farrell's Flat | 1·21 | 2·58 | 2·26 | 18·87 |
| **West of Murray Range.** | | | | |
| Manoora | 1·19 | 3·86 | 2·17 | 18·09 |
| Saddleworth | 1·07 | 3·55 | 2·52 | 19·69 |
| Marrabel | 1·05 | 3·11 | 2·14 | 18·94 |
| Riverton | 1·48 | 5·20 | 2·47 | 20·48 |
| Tarlee | 1·17 | 3·39 | 2·23 | 17·48 |
| Stockport | 1·25 | 2·79 | 2·07 | 15·89 |
| Hamley Bridge | 1·09 | 3·00 | 2·19 | 16·45 |
| Kapunda | 1·17 | 2·92 | 2·53 | 19·67 |
| Freeling | 1·03 | 2·63 | 2·23 | 17·85 |
| Greenock | 1·39 | 3·27 | 2·37 | 21·46 |
| Truro | 1·23 | 3·27 | 2·21 | 19·74 |
| Stockwell | 1·13 | 3·15 | 2·23 | 20·30 |
| Nuriootpa | 1·03 | 2·82 | 2·34 | 21·25 |
| Angaston | 1·37 | 3·43 | 2·36 | 22·25 |
| Tanunda | 1·15 | 2·92 | 2·58 | 22·28 |
| Lyndoch | 1·40 | 3·32 | 2·25 | 23·01 |
| Williamstown | 1·59 | — | — | — |
| **Adelaide Plains.** | | | | |
| Mallala | 1·11 | 3·38 | 2·11 | 16·88 |
| Roseworthy | 1·08 | 3·25 | 2·14 | 17·31 |
| Gawler | 1·28 | 4·01 | 2·36 | 19·21 |
| Two Wells | 1·07 | 3·08 | 2·05 | 16·36 |
| Virginia | 1·62 | 4·03 | 2·19 | 17·58 |
| Smithfield | 1·34 | 4·25 | 2·25 | 17·30 |
| Salisbury | 1·71 | 4·41 | 2·35 | 18·57 |
| North Adelaide | 3·25 | 6·51 | 2·47 | 21·49 |
| Adelaide | 2·50 | 5·34 | 2·39 | 21·04 |
| Brighton | 2·59 | 6·09 | 2·47 | — |
| Glenelg | 1·99 | 5·18 | 2·26 | — |
| Magill | 2·95 | 6·06 | 2·85 | 19·93 |
| Glen Osmond | 3·11 | 6·39 | 2·63 | 25·26 |
| Mitcham | 3·07 | 6·03 | 2·42 | 23·47 |
| Belair | 3·27 | 6·54 | 3·00 | 28·64 |

## RAINFALL—*continued.*

| Station. | For Mar., 1917. | To end Mar., 1917. | Av'ge. to end Mar. | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| **Mount Lofty Ranges.** | | | | |
| Teatree Gully | 2·34 | 5·06 | 3·23 | 28·19 |
| Stirling West | 5·18 | 9·34 | 4·46 | 46·70 |
| Uraidla | 4·81 | 8·46 | 4·44 | 44·35 |
| Clarendon | 3·25 | 6·98 | 3·52 | 33·67 |
| Morphett Vale | 1·96 | 5·28 | 2·66 | 23·32 |
| Noarlunga | 1·79 | 5·80 | 2·26 | 20·28 |
| Willunga | 2·04 | 6·38 | 2·74 | 25·98 |
| Aldinga | 1·80 | 6·21 | 2·36 | 20·34 |
| Myponga | 1·74 | 6·61 | — | — |
| Normanville | 1·13 | 5 20 | 2·13 | 20·65 |
| Yankalilla | 1·26 | 5·64 | 2·50 | 22·78 |
| Cape Jervis | 0·86 | 3·90 | 1·62 | 16·34 |
| Mount Pleasant | 1·62 | 3·77 | 2·70 | 26·87 |
| Blumberg | 2·18 | 4·79 | 3·00 | 29·38 |
| Gumeracha | 2·63 | 6·14 | 3·21 | 33·30 |
| Millbrook Reservr. | 2·83 | 5·68 | — | — |
| Lobethal | 2·86 | 5·45 | 3·13 | 35·38 |
| Woodside | 3·25 | 5·99 | 3·08 | 31·87 |
| Hahndorf | 3·21 | 5·19 | 3·35 | 35·45 |
| Nairne | 2·74 | 5·29 | 3·33 | 28·83 |
| Mount Barker | 3·79 | 6·70 | 3·31 | 30·93 |
| Echunga | 3·79 | 6·64 | 3·42 | 32·83 |
| Macclesfield | 2·96 | 5·74 | 3·15 | 30·72 |
| Meadows | 3·44 | 6·48 | 3·74 | 35·52 |
| Strathalbyn | 1·79 | 3·69 | 2·48 | 19·28 |
| **Murray Flats and Valley.** | | | | |
| Wellington | 1·44 | 2·98 | 2·24 | 15·01 |
| Milang | 0·86 | 2·42 | 2·12 | 16·08 |
| Langhorne's Brdg | 1·13 | 2·79 | 2·07 | 15·27 |
| Tailem Bend | 1·57 | 4·53 | — | — |
| Murray Bridge | 1·21 | 2·58 | 2·15 | 14·32 |
| Callington | 1·62 | 3·49 | 2·22 | 15·65 |
| Mannum | 0·52 | 2·07 | 1·86 | 11·67 |
| Palmer | 0·45 | 1·99 | 2·23 | 15·60 |
| Sedan | 0·38 | 3·41 | 1·62 | 11·92 |
| Swan Reach | 0·42 | 2·29 | — | — |
| Blanchetown | 0·30 | 0·97 | 1·94 | — |
| Eudunda | 0·67 | 2·14 | 2·16 | 10·71 |
| Sutherlands | 0·59 | 1·50 | 1·40 | 17·33 |
| Morgan | 0·49 | 1·46 | 1·51 | 10·60 |
| Waikerie | — | 2·55 | — | 9·29 |
| Overland Corner | 0·38 | 3·35 | 2·02 | 11 42 |
| Renmark | 0·26 | 4·66 | 1·81 | 10·93 |
| Loxton | 0·44 | 6·08 | — | — |
| **West of Spencer's Gulf.** | | | | |
| Eucla | 1·32 | 2·07 | 2·16 | 10·13 |
| White Well | 0·85 | 2·46 | 1·58 | 9·67 |
| Fowler's Bay | 0·91 | 2·23 | 1·32 | 12·11 |
| Penong | 0·94 | 2·46 | 1·39 | 11·93 |
| Murat Bay | 1·14 | 2·86 | — | — |
| Smoky Bay | 0·90 | 2·16 | — | — |
| Petina | 0·56 | 2·38 | — | — |
| Streaky Bay | 0·82 | 2·49 | 1·54 | 15·31 |
| Talia | 1·15 | 3·57 | — | — |
| Port Elliston | 1·58 | 3·20 | 1·39 | 16 49 |
| Cummins | 1·10 | 3·28 | — | — |
| **West of Spencer's Gulf—*continued.*** | | | | |
| Port Lincoln | 1·29 | 3·04 | 2·06 | 19·88 |
| Tumby Bay | 1·11 | 3·62 | 1·50 | 15·00 |
| Carrow | 1·45 | 5·85 | — | — |
| Arno Bay | 1·55 | 3·74 | — | — |
| Cowell | 1·00 | 3·85 | 1·75 | 11 76 |
| Point Lowly | 0·67 | 4·17 | 2·01 | 12·21 |
| Hummock Hill | 0·69 | 4·91 | — | — |
| **Yorke's Peninsula.** | | | | |
| Wallaroo | 0·93 | 2·94 | 1·83 | 14·05 |
| Kadina | 1·16 | 2·95 | 1·84 | 15·88 |
| Moonta | 1·40 | 4·21 | 1·84 | 15·22 |
| Green's Plains | 1·02 | 3·20 | 1·69 | 15·73 |
| Maitland | 1·50 | 4·75 | 2·04 | 20·08 |
| Ardrossan | 1·01 | 3·33 | 1·65 | 13·89 |
| Port Victoria | 1·50 | 4·92 | 1·60 | 15·21 |
| Curramulka | 1·87 | 5·96 | 2·02 | 18·50 |
| Minlaton | 2·46 | 5·25 | 1·75 | 17·41 |
| Stansbury | 2·08 | 5·91 | 1·86 | 17·06 |
| Warooka | 1·43 | 5·91 | 1·59 | 17·71 |
| Yorketown | 1·08 | 4·55 | 1·66 | 17·47 |
| Edithburgh | 1·15 | 4·42 | 1·87 | 16·48 |
| Port Vincent | 1·44 | 5·32 | — | — |
| **South and South-East.** | | | | |
| Cape Borda | 1·15 | 2·97 | 2·19 | 25·09 |
| Kingscote | 1·06 | 5·22 | 1·77 | 18·95 |
| Penneshaw | 0·76 | 3·65 | 2·23 | 21·34 |
| Cape Willoughby | 1·24 | 3·36 | 2·16 | 19·69 |
| Victor Harbor | 1·61 | 5·30 | 2·56 | 22·18 |
| Port Elliot | 1·34 | 4·70 | 2·45 | 20·33 |
| Goolwa | 1·37 | 4·14 | 2·33 | 17·93 |
| Pinnaroo | 0·53 | 2·15 | 2·59 | 16·74 |
| Parilla | 0·51 | 2·09 | — | — |
| Lameroo | 0·55 | 2·06 | 2·09 | 16·55 |
| Parrakie | 0·92 | 2·49 | — | — |
| Geranium | 1·45 | 2·79 | — | — |
| Peake | 1·31 | 3·36 | — | — |
| Cooke's Plains | 1·74 | 4·43 | 2·06 | 14·74 |
| Meningie | 1·42 | 4·27 | 2·20 | — |
| Coomandook | 1·70 | 3·94 | 0·71 | 17·49 |
| Coonalpyn | 1·58 | 3·96 | 2·07 | 16·80 |
| Tintinara | 1·96 | 3·28 | 2·31 | 18·78 |
| Keith | 1·41 | 3·95 | — | — |
| Bordertown | 1·28 | 4·34 | 2·17 | 19·76 |
| Wolseley | 1·28 | 3·03 | 1·86 | 17·72 |
| Frances | 0·94 | 3·32 | 2·32 | 20·74 |
| Naracoorte | 1·53 | 3·69 | 2·56 | 22·60 |
| Penola | 1·85 | 3·86 | 3·24 | 26·78 |
| Lucindale | 1·05 | 2·56 | 2·46 | 23·32 |
| Kingston | 0·87 | 2·87 | 2·45 | 24·73 |
| Robe | 0·86 | 2·88 | 2·53 | 24·69 |
| Beachport | 1·35 | 3·95 | 3·02 | 27·51 |
| Millicent | 1·70 | 3·06 | 33·1 | 29·25 |
| Kalangadoo | 2·09 | 4·28 | — | 32·00 |
| Mount Gambier | 1·69 | 3·79 | 4·04 | 26·63 |
| C. Nrthumberland | 1·43 | 2·72 | 3·02 | 18·87 |

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| Borrika | * | — | — |
| Bowhill | * | — | — |
| Brentwood | * | 5 | 3 |
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| Burra | * | — | — |
| Bute | * | — | — |
| Butler | ‡ | — | — |
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* No report received during the month of March. † Formal report only received.
‡ Held over until next month.

# ADVISORY BOARD OF AGRICULTURE.

## Date of Meeting—May 9th, 1917.

# THE AGRICULTURAL BUREAU OF SOUTH AUSTRALIA.

**Every producer should be a member of the Agricultural Bureau. A postcard to the Department of Agriculture will bring information as to the name and address of the secretary of the nearest Branch.**

**If the nearest Branch is too far from the reader's home, the opportunity occurs to form a new one. Write to the department for fuller particulars concerning the work of this institution.**

# REPORTS OF BUREAU MEETINGS.

## UPPER-NORTH DISTRICT.

### (PETERSBURG AND NORTHWARD.)

MOUNT REMARKABLE, January 13th.—Mr. W. Foot produced samples of Lott's, Dart's Imperial, and Marshall's No. 3 wheats. The best head was selected from each variety, and the grains counted as follows:—Lott's 63, Dart's Imperial 69, Marshall's No. 3 74. When weighed the 63 of Lott's were equal to the 74 of Marshall's No. 3. On December 6th Mr. N. S. Giles, B.Sc., produced samples from his farm, and the number of grains from three heads of each variety was as follows:—Lott's 310, Federation 217, Bunyip 212, Yandilla King 210, Comeback 207, and Cumberland 205. The weights were not taken.

MOUNT REMARKABLE, February 28th.—Discussion took place as to the relative merits of various farming implements. The opinion was generally voiced that although the harvester in a crop which stood up well saved nearly as much grain as the reaper and thrasher, yet the cutting device of the latter stamped it as the better machine in the tangled and frequently rotten straw of the present season's crops. In any case it was held that cutting saved more grain than beating. The divider and the roller were the parts which helped to give pre-eminence to the reaper and thrasher. Samples of Federation, Yandilla King, and Bunyip grain were submitted by Mr. H. E. Challinger, who stated that Federation on the heavy ground stood up better and showed finer grain than the same wheat on looser ground. It was sown earlier, and showed less straw than the others. In regard to weight of grain, 100 grains of Federation were equal in weight to only 84 grains of Yandilla King, and only 66 grains of Bunyip, both reaped before the rain. Of Federation 97 grains reaped before the rain weighed the same as 100 grains reaped after the rain.

WEPOWIE, March 3rd.—Discussion took place as to the merits of different methods of harvesting, the general opinion being that the reaper and thrasher were the best for saving labor.

WILMINGTON, March 7th.—Mr. A. J. G. Benier read a paper on the mismanagement of the farm, in which he detailed a number of shortcomings in management to which farmers were prone. He recommended that every farmer should carry a notebook, in which to jot down the things which required to be done, and the ideas which suggested themselves to an intelligent and observant man in moving about the farm, but which were often lost through lack of memory.

## MIDDLE-NORTH DISTRICT.

### (PETERSBURG TO FARRELL'S FLAT.)

### WIRRABARA (Average annual rainfall, 18.91in.).

February 3rd.—Present: 13 members.

Colic in Horses.—A paper was read by Mr. P. J. Curnow on colic in horses, in the course of which he said that one of the most common diseases of the horse was colic or gripes. Owing to its acute form it required prompt diagnosis and treatment. Before dealing with the subject in a general way, he would first consider that part of the horse's anatomy which became affected. The stomach and intestines, that was the digestive apparatus generally, was furnished with three coats. The outer coat was composed of a series of membranes (a shining lubricating substance), which prevented the parts from sticking to each other or to the walls or the cavity of the abdomen. The second or middle coat was muscular. The third or inner lining was composed of mucous membrane. That great mass of blood vessels which fed the stomach was situated on the surface of the muscular coat, immediately under the inner lining membrane. All those diseases such as colic or gripes, intussusception, or the entanglement of one gut with another, peritonitis, or inflammation of the mucous membrane, and other such affections, though they were known by many names, according to the part or membrane attacked, might be simply classified under two heads, namely, colic and inflammation of the stomach and intestines. Those two diseases admitted of an easy and general definition. Colic was spasm of the muscular wall of the muscular coat or any part of the intestines; whilst the other was inflammation of the series, or of the muscular and mucous coats. When colic occurred within an hour or so after a full meal, its usual seat was in the small intestines, but at other times it arose from impaction of food in the large intestines. The spasm caused great pain while it lasted, and was due to nervous influence causing sudden contraction of the muscular coat, which necessarily arrested the motion of the part. The early sign of colic was pain, evidently in the region of the intestines, and was indicated by the animal looking around to its flanks. As the pain increased the patient would scrape with its fore feet, kick at its belly, walk round or throw itself down, and get up quickly or roll over or kick. The nature of the disease was further recognised by the fit passing away, for it was only a spasm. It, however, soon returned. There was an absence of fever in that affection and the pulse was only quickened during the spasm. During the attack the horse would sometimes pass hard, angular dung pellets. That peculiarity of hardness and shape was due to the spasmodic contraction of the gut. The belly was tense and sometimes preceptibly swollen and very sensitive to pressure. In some cases it was much distended by the generation of gases arising from undigested or improper food. That peculiar condition was known as flatulent colic. It was most common in farm horses. From pain, and knocking about, the horse sweated much, but dried as the spasm passed away. There was always danger when the horse threw itself about during an attack of colic, of it injuring itself by rupturing some internal vessel. Every effort should, therefore be made to encourage the affected animal to either stand or lie quietly during an attack, even if the services of several men were required for the purpose. If the disease were not soon relieved the pulse would become very frequent, contracting to a mere thread. After six hours duration there was ground for serious apprehension. Favorable indications were given by increase in the intervals between the attacks and by each attack becoming slighter. If the patient passed wind freely and soft dung that also might be regarded as a favorable sign. In pure colic the extremities continued warm and the skin remained in its natural state. The symptoms were only those of great spasmodic pain. There was no sign of inflammation. The causes of colic were various. The most common was error in feeding or watering. Among other common causes were worms, obstructions in the intestinal canal such as hair balls or hard binder twine when cut up in the chaff, and dust balls, from which millers' horses sometimes suffered, and the giving of draughts of cold water to overheated animals after their work was over. Colic might also be caused through indigestion by allowing animals to stand in a draught, or in a gelding through a dirty sheath. Sudden changes in diet or water and an excessive quantity of feed at one time, especially after work on an empty stomach, were all predisposing causes of the disease. Colic generally ended favorably under proper treatment, but where rupture of an internal organ took place, brought about by the animal throwing itself about, a fatal ending ensued. Horses light in the loins, and "washy" colored animals were liable to colic, very slight causes bringing on an attack. When many attacks had occurred an animal generally succumbed in the long run to the disease or some of its complications. The treatment of colic needed careful consideration. In the first place it was wise to discover, if possible, the cause of the attack. That would help to decide the course of treatment, and also to prevent future attacks. The first thing to do was to rub the belly thoroughly. That would increase the motion of the intestines and draw the blood to the surface. A handful of clean straw was the best to use. The legs should be well rubbed, and in a very bad attack they should be clothed in flannel bandages. Ammonia liniment was a good thing to rub on the abdomen. The giving of medicine was necessary, and would often cut an attack short. Two ounces of spirit of nitrous ether, with an ounce of tincture of opium and half an ounce of aromatic spirits of ammonia given as a drench in a pint of water made an excellent colic draught. Few remedies, however, exceeded the sedative effects of camphor combined with nitric ether, a drachm and a half of the former and an ounce of the latter, given in 12ozs. of water. An enema made by mixing 2ozs. of linseed oil with two quarts of water well shaken together, should be injected. By depressing the animal's tail it might be induced to hold the water for 10 minutes or so. The object of that was to induce contractive action of the bowels. If that treatment did not cause relief then a stimulant composed of four or five drachms of aloes given in one and a half ounces of nitrous ether should be given. If throughout the treatment the animal could be induced to lie down so much the better. If after two hours of the above treatment the spasm continued hot fomentations should be applied by steeping a rug in hot water and holding to the affected part. To prevent chill ammonia liniment should be applied to the abdomen. If the affected animal did not show rapid improvement under the above treatment it might be taken for granted that other symptoms had set in, and skilled attention was urgently needed.

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CRYSTAL BROOK, March 10th.—The Secretary of the Experimental Committee read the report of the year's work, in which he stated that plots 1, 2, 3, 4, 5, and 6 were sown on May 22nd and 23rd, 1916. The six plots were treated with 45lbs. of phosphate (36-38 per cent.). One-half of No. 4 was treated with sea shell, and no difference in growth could be detected. Plots 7, 8, and 9 were treated with 30lbs. of phosphate, and plots 10, 11, and 12 with 20lbs. of phosphate per acre. Yields—No. 1, Bayah, 25bush. per acre; No. 2, Commonwealth, 20bush. per acre; No. 3, Moriah, 20bush. per acre; No. 4, Dreadnought, 30bush. Nos. 5, 6, 7, and 8 were all down badly, and were all reaped together. No. 9, Marquis, yielded 18bush. per acre, but shed out badly. No. 10 was mixed seed. No. 11 Huron, mid-season, strong straw, held grain well, yield, 37bush. per acre. No. 12, Prelude, shed grain badly; very early; yield, 23bush. per acre. Nos. 10, 11, and 12 were obtained through Sir Joseph Carruthers, direct from Canada, and should improve another year.

WHYTE-YARCOWIE, March 10th.—Discussion took place on the result of the harvest. The general opinion was that the harvest had been very satisfactory. The crops had been very late, but the yield good. The sample was good and free from smut. Mr. F. H. Lock said that his experience showed that Federation was the wheat for the district, yielding better than other varieties, standing up well, and was easy to reap. Clean land yielded best. Wherever mustard or other weeds grew the wheat yield diminished. All members were agreed on that point. Mr. A. E. Green said that the good germination at seeding time was largely responsible for the good harvest.

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## LOWER-NORTH DISTRICT.

### (ADELAIDE TO FARRELL'S FLAT.)

### LONE PINE.

March 6th.—Present: 20 members and one visitor.

THE BOT FLY.—The bot fly was dealt with by Mr. J. A. Buttfield, in a paper in which he described the external appearance of the insect, and in dealing with its habits remarked that in summer the female fly hovered over the horse, then suddenly descended and deposited her conical white eggs among the hairs of the animal's shoulder or inside the knee. The eggs were attached to the hair by means of a sticky fluid. The eggs hatched in a week or 10 days, and the larvae, crawling about, so irritated the skin that the horse licked the maggots off and swallowed them. In the stomach they attached themselves to the coating by means of the little hooks. There they lived through the autumn and spring, causing irritation and inflammation. Eventually passing out in the dung, they pupated in June, and the imago appeared about a month later. The larvae might be found in the rectum of the horse in great numbers in the early summer. To combat the fly in the first instance it was necessary to keep the animal's hair short, and apply a strong-smelling solution to prevent the fly from settling on it. The hair of the horses at grass should be frequently examined, and eggs removed by means of warm water in which a little soda had been dissolved. The horses should live under pure and healthy conditions, and in that way it would be enabled, if attacked, to withstand more effectually the effects of the internal discomfort.—In answer to a question, Mr. Buttfield recommended train oil as a solution which would keep bot flies away. Mr. J. G. Hoffmann advocated the use of a mixture of one part oil of tar and 10 parts of olive oil, and also that the horse should be washed three times during the summer.

### RIVERTON (Average annual rainfall, 20.48in.).

November 18th.—Present: 19 members and one visitor.

Sanitation on the Farm.—Although at first thought, observed Mr. F. Phillips in a paper on sanitation on the farm, the subject might not seem very important, when it was examined it appeared that it required more attention than it was usually given in farm life. It might be argued that the health of the farmer and his family was above the average of people in other walks of life. That might be so, but it did not follow that sanitation on the farm received sufficient attention. Every farmer had to fight the house fly to a certain extent during the summer months, both in the home and out in the field. He did not contend that the various methods that could be used were going to wipe out the flies, but they would help to a large extent to decrease them, especially if everyone recognised the danger which flies were to human beings as well as a torment to animal life, and helped to fight them. First they should examine the stable, where they would find one of the main breeding grounds of the fly. Manure left in the stable over one week was soon hatching out its batches of young flies. During the harvest months it was very difficult to find time to keep the yards and stables free from manure, and of course the farmer had to let it go and wait for a wet day. If about every three or four days they would take the trouble to throw some gypsum over the manure in the stable and manure heaps it would prevent flies from breeding to a very large extent, and, at the same time, enrich the manure. Failing that residual oil could be used. It was a cheap disinfectant, costing about 8d. or 9d. per gallon, when diluted with water. A strength of about 1 in 1 could be sprayed over the manure every third or fourth day with good results. That oil was largely used in all military camps to prevent the fly nuisance. Then there was the cowshed, which needed more attention than it received. Often, during the very height of summer it was as much as one could do to milk with two hands because of the flies. In milking care should be taken that all buckets, &c., were clean, scalded, and free from dust. The cow's teats should be well washed, and as a precaution a brush kept for the use on the cow's belly and udder to remove any small pieces that might otherwise fall into the milk bucket. In America, where large numbers of cows were kept, they had vacuum cleaners which they ran over the cow and removed particles of dust before the herd was milked, thus enabling them to overcome the dirt nuisance and give a healthy, clean product for consumption. In the average farm closet pit, pan, or septic tank was used. If pit or pan were provided plenty of disinfectant should be used. Lime was a fair disinfectant, but residual oil mixed with sawdust was better when applied each time the closet was used. It also kept flies away, and prevented them breeding. A septic tank was by far the best plan, but could only be used where there was a good water supply. The cost of erection was supposed to be about £18, but he believed that it could be done more cheaply, and £10 to £12 should cover the cost, if the farmer supplied most of the labor. When once erected a septic tank would last a lifetime without much trouble. Until sanitation could be practised on the farm with some idea of a system through the State all farmhouses should be supplied with wire screen doors, windows, and over the chimney during the summer, both from a health point of view and comfort. The best means to get rid of wash-up water from the house was to dig a big hole about 6ft. x 6ft. down to the wash dirt, and fill up with stones or clinkers to within 2ft. of the top. Then a drain should be made about 6ft. or 8ft. in length leading to the pit, and should be paved with bricks, or a sheet of galvanized iron. Straw should be placed in the drain, and all fatty substances would adhere to it. The straw could then be burned, and the drain replenished with fresh straw. Occasionally some disinfectant could be sprinkled in the pit. The paper was well received by the Branch. Members agreed that it was a subject that was overlooked. If some system were entered upon by each occupier it would add much to the home, both in regard to health and comfort.

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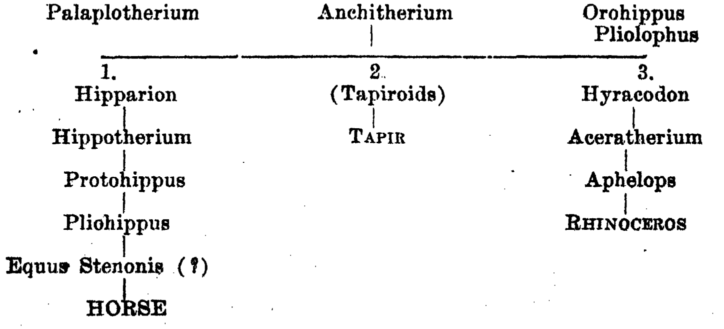
### SALISBURY (Average annual rainfall, 18.57in.).

February 6th.—Present: 13 members.

The Evolution of the Horse.—Mr. R. W. Cilento read a paper entitled "The Evolution of the Horse," as follows:—"I have chosen the horse as a subject of this paper, firstly, because it is an animal familiar to each of us, and, secondly, because it presents a history—actual and fossil—which is perhaps the most complete evolutionary story as yet recorded. In preparing my notes I have consulted a number of authorities, and practically the whole of my paper consists of extracts from one or other of their works, cemented together with an occasional idea of my own. With regard to the theory of evolution itself, some may remember my speaking on it recently, and it is my intention to-night to take it for granted, merely remarking that though as yet our records are imperfect, although immense and varied, every new discovery has tended to corroborate, and nothing has ever been found inconsistent with the view that all living things have acquired their present forms by the modification of pre-existing forms. The horse has been associated with man for thousands of years. Long before the dawn of history we find evidences that the men of the Stone Age hunted and ate the horses that roamed the pastures of Europe, domesticated them later, and used them in various ways, sometimes amusing themselves by scratching drawings of them on walls of caves or on bones, where thousands of years later they have been found. We know from Biblical records that Jacob used horses, and we find, in Kings, a reference to Solomon's purchasing of horses bred in Egypt. Three thousand nine hundred years ago we begin to see the horse in the monuments and on the tablets of Egypt, and later on again references are frequent and varied. Thus Herodotus, 'the father of history,' writing about 450 B.C. about the country north of the Danube, says:—'The only people of whom I can hear as dwelling beyond the Ister are the race named Sigynnae, who wear, they say, a dress like the Medes, and have horses which are covered entirely with a coat of shaggy hair five fingers long. They are a small breed, flat-nosed, and not strong enough to bear men on their backs, but when yoked to chariots they are among the swiftest known, which is the reason why the people of that country use chariots.' A countryman of Herodotus, Xenophon, writing 2,300 years ago, has left us an excellent treatise on the horse which may interest you:—'The first thing,' he says, 'that ought to be looked at is the foot, for just as a house would be of no use if the lower part had not a proper foundation, so the horse would not be of any use in war if he had tender feet even though he had all other good qualities, for his good qualities could not then be made any valuable use of. Thick hoofs make a horse's feet better than thin ones, and do not forget to see whether the hoofs are high or low and near the ground, both before and behind. The pasterns or bones immediately above the hoofs and below the fetlocks ought not to be straight, like those of a goat, for this would shake the rider, and such legs are more subject to inflammation, nor ought these bones to be very low, for the fetlock would thus be chafed and ulcerated if the horse was ridden over ploughed land or among stones. The bones of the leg ought to be large, since they are supporters of the body, but not, however, thick with veins, or with cellular substances. If the colt in walking bends his knees freely you may judge when he comes to be ridden that his legs will be supple, and supple joints are justly commended as they make a horse less liable to stumble and not tire so soon as when his joints are rigid. The forearms, when they are large, are both powerful and graceful, and the chest being large contributes not only to beauty and strength, but to a horse being able to continue a long time in the one pace. The neck should proceed from the chest curving upwards, and it should be loose about the bend of the head. The head itself being bony should have a small cheek. The eye should be standing out and not sunk in the cheek. The nostrils that are wide are not only better adapted for breathing than those that are compressed, but give the horse a more terrifying appearance in war. The top of the head being large and the ears small make the head appear more elegant, the point of the shoulder likewise being high renders that part of the body more compact. The sides being deep and swelling towards the belly make a horse in general more easy to be seated on and better able to digest the food. The broader and shorter his loins are the more readily will he throw his forefeet out, and the belly that appears small, although large, not only disfigures a horse, but makes him weaker and less able to carry his rider. Haunches should be large and fleshy to correspond with the sides and chest, and when all these are firm they make a horse lighter for the course and fuller of animation.' So much for the Greek horse. Terentinus Varro, who lived about 70 B.C., has left us an interesting description of the horse, which perhaps could not be bettered by many a skilful horse fancier. He says:—'We may anticipate great things of a colt if, when running in the pastures, it is ambitious to get before its companions, and if, on coming to a river it strives to be first to plunge into it. His head should be small, his limbs clean and compact, his eyes bright and sparkling, nostrils open and large, his ears placed close together, his mane strong and full, his chest broad, his shoulders flat and sloping backwards, his barrel round and compact, his loins broad and strong, his tail full and bushy, his legs straight and even, his knees broad and well knit, his hoofs hard and tough, and his veins large and swelling all over his body.' The horse of the Romans (who after the Greeks dominated the known world) was, however, until a later date, an inferior animal, and whenever Romans and Greeks met in battle the cavalry of the former was constantly defeated by that of the latter. Julius Cæsar used horses from France against his great rival, Pompey, and easily rode down the inferior Roman breed. Until the Romans adopted a heavier type of horse from Asia the Asiatic breeds always triumphed over the European. As regards the horses used in Libya and Numidia, Aelian tells us that they were slenderly built, carried little flesh, and subsisted on scanty herbage, while the Egyptian horse, as we see it in wall paintings and carvings, was a heavy lumbering type with a large, coarse head, high crest, and a body like that of a Flemish draught. The horse of the Britons that was first recorded was there before the Romans came and invaded the country. Dion Cassius tells that near London and Dover Cæsar met cavalry and charioteers, which formed the chief arm of the British, whilst in the highlands of Scotland the ancestors of the Scotch (the Caledoniæ and Mæatae) did not ride to battle, but drove in chariots, because their horses were so small and swift. So much then for early references. As regards the uses to which horses were put we have also some statements. In Greece, 774 B.C., the Olympian Games, four-yearly contests, were instituted, and at the 23rd Olympiad, 680 B.C., horse racing was for the first time a feature. The course was four miles long, and on the first two occasions the horses were ridden, but following that were always driven in chariots. The speed and endurance of the animals were tested by the distance, while the ability of the driver was displayed as he rounded the pillars and avoided the obstacles that rendered the path difficult. The most common use of the horse by far was for war. The Greeks rode without either saddle, bridle, or stirrups, and guided the horse either with a stick or with the finger tips. It was taught that a touch on the right side of the face meant to go to the left, a touch on the muzzle halt, and a heel in the flank go ahead. The horse's mane was cut either in an arch or in a highly-crested line decorated with bells and ribbons, or was parted and turned equally over each side, or again, was combed over to the right. Later this combing to the right became general, and the rider took advantage of it to mount, for the ancients mounted always on the right. Although we mount always on the other side, as a rule we still comb the mane to the right. Having no stirrups it was usual either to vault on to the back of the horse or to use the neck or back of a slave or a mounting post as a foot rest, and later it was customary to have a loop 2ft. up the shaft of the spear which served both to mount and to make the hold of the spear more secure. Arrian relates that the Persians used no bridles, but governed their horses by means of a thong cut from rawhide and bound across the nose. Inside this little brass or ivory teeth were placed, and a small bar of iron was placed in the mouth. To the ends of this the reins were tied, and when pulled upon the sharp little teeth compelled the horse to obey the will of its rider. Later the Greeks invented the snaffle bit, and both rode and drove with it, and later again the Romans invented the curb bit. No shoes were worn, but if the hoof gave out and the animal went lame they used a kind of sandal tipped with iron, or in the case of Nero, with gold. History and research confirm us in the belief that the earliest horses were small and shaggy, and we can hence readily imagine that until crossing and careful attention—selective or evolutionary breeding, in short—had been practised, and had resulted in a larger type, horses were too small to ride, and were used as Herodotus, Cæsar, and Deon Cassius tell us, only for chariots. About 400 B.C. the men of France went to war in chariots, but 300 years later they were riders. They had imported new strains, and had developed heavier horses that were capable of being useful either as chariot horses or as cavalry, and had themselves become not only charioteers but also expert horsemen. It was 1,000 later, in the time of the Normans (when William the Conqueror came over to England) that horses were first used in agriculture, and the Normans too were the first we know of who used the stirrup. Now as regards the horse itself. The horse belongs to the vertebrata, *i.e.*, backboned animals, and to that class of vertebrata called ungulata, *i.e.*, hoofed animals; and of the ungulata it belongs to the odd-toed division ,*i.e.*, perissodactyla. It is described as having a tail hairy to the root, small callosities or corns on the inner sides of the hind legs just below the hock or heel joint, in addition to the ones on the forelegs, common to its relatives the donkeys; a longer flowing mane with a forelock, shorter ears, longer limbs, broader feet, and smaller head. Its grinders or cheek teeth have large crowns with ridged surfaces; it does not lose its milk teeth until it has nearly attained maturity. It has no collarbones (or clavicles). Its limbs are used for carriage, its toes are blunt with broad nails more or less surrounding or enclosing the ends, and called hoofs. This, then, is the horse as it is. What can we say of the horse as it was? As you know the earth's surface has gradually been built up by successive deposits of soil, and if they never had been disturbed you can easily appreciate the fact that the newest would be those on the top and that the further we dug down the older the rock, and the further back in history the animals we find in it. For convenience of description and other reasons these successive deposits have received different names, and the bones of the animals found in them have been ascribed to particular periods, *e.g.*, Eocene, Miocene, Pliocene. There are two lines of proof of the evolution of the horse:—(1) From bones of its ancestors; (2) from vestigial remains in the body of the horse itself. We are taught that the one-toed horse descended from a five-toed ancestor, and that the change was brought about (*a*) by changes of surroundings, both as regards soil and food; (*b*) by selective breeding or natural selection; (*c*) perhaps by an inherent tendency to develop along certain lines. Long ago Huxley said:—'The knowledge we now possess justifies us in the assertion that as discovery proceeds animal forms with four toes and a rudiment or remnant of a fifth will be found, while in still older forms the series of digits will be more and more complete until we come to five-toed animals in which the whole series must have originated.' This statement has now been completely verified by the discovery of an animal called Phenacodus. This animal has hoofs, no collarbones, and lives on herbs and grasses. It was the first ungulate and was a definite type. It had a very low type of brain, and possessed $i.\frac{3}{3}$, $c.\frac{1}{1}$. $p.\frac{4}{4}$, $m.\frac{3}{3}$. $= \frac{11}{11} \times 2 = 44$ teeth, which is the common number of teeth found in tertiary types, and still exists in the pig and some insect eaters, and very rarely in some horses. All teeth formulae are a modification of this formula. The tail of the phenacodus was long and trailed on the ground, its shoulderblade and its upper arm were of the same type as the flesh-eating animals from which it was descended; it had five toes, and it walked not on the whole sole of its foot as we do, nor on the tips of its toes as the horse does, but at a halfway stage. Following the phenacodus we have an animal called in Europe Hyracotherium, and in America a very closely allied type, the Eohippus. From these, as you see on the chart, sprang a number of forms, making up a large family—the Lophiodon family—and from these we have three main branches, closely related, of which the representatives to-day are respectively the tapirs, the rhinoceros, and the horse family.

(This chart, by the way, was compiled by me from various sources, and I do not claim that it is correct, but in the rough it will suffice.)



To take each family in brief. *Tapirs.*—Heavy, thick-set animals with short stout limbs, the forefeet have four toes each, are hoofed with a large round callous pad for walking. Its nose and upper lip form together a small trunk or proboscis, its eyes are small, like those of a pig; its ears are moderate size, ovate, and erect; its tail is very short; its skin thick and smooth, with short harsh and rather scanty hair. In its habits it is solitary, and goes about at night. It is shy, inoffensive, and frequents the depths of shady forests and the neighborhood of rivers or waterholes; it feeds on vegetables, and has perhaps persisted as at present for a longer time than any other type has remained unchanged. *Rhinoceros.*—Has a large head; moderate ears, oval, erect, prominent, and near the back of the head. Its eyes are small, its neck short, its skin extremely thick, indurated, and in some species forms thick plates. The hair is scanty, the tail moderately long, slightly tufted at the end, and its limbs are stout and short. Each foot has three toes, with distinct broad, round hoofs. It has in most cases one or two horns in the midline of the face. It is a modification from the stock of hyracotherium, as shown, and is generally unintelligent and shy, but if brought to bay is ferocious. Its sight is dull, but its hearing and scent are remarkably acute. It feeds on herbage and shrubs, sleeps the greater part of the day, and is fond of wallowing in mud. These, then, are the nearest living relatives of the horse, ass, and zebra family, and present many points of resemblance. They are not, however, in the direct line of the horse's ancestors. That animal, as has been said, and may here be seen, descended from the eohippus and the phenacodus. The eohippus had four toes and a rudiment of a fifth (sometimes wanting); its teeth were very much like those of phenacodus, and the great gap between the cheek teeth and the nippers, the 'bar' that makes it possible to use a bit, had not appeared. The crowns of the teeth, too, did not show the same pattern as those of the present day horse, but were already beginning to be modified along the parallel lines. The little animal was only about the size of a fox or dog, and was beginning to leave the marshes in which phenacodus spent its life and to take up its existence on the drier plains with the tougher vegetation that in that situation supplanted the juicy herbage of the marshes. This next animal, the anchitherium, had three toes on each foot, and was somewhat larger; a gap had appeared between its tushes (canines) and its cheek teeth, but it still had the same number of teeth as its ancestors, although it was now very evident that they were assuming the same shape and peculiar arrangement as those in the horse of to-day. Then in hipparion we have a larger three-toed animal with a large head, an ugly Roman nose, and probably long hair. It had under its eye a 'crumen,' or oil gland, and some say from this that it could not have been an ancestor of the horse; but, in this connection, it is interesting to note that the racehorse Bend Or had a depression strongly developed in this situation, and there are numerous other examples of its occurrence. The teeth of hipparion are very similar to the teeth of our horses, and show an undoubted relationship. Like our horses, too, it had lost one of its cheek teeth, and had six instead of seven. In this connection, as showing a relationship, it is interesting to note that occasionally a seventh tooth makes its appearance in a horse of to-day. When it does occur it is small, blunt, and badly formed. It is called a 'wolf's tooth,' and used to be pulled out by farriers when it appeared, under the mistaken belief that it affected the eyesight. How this could possibly be so I leave to your imagination, as my own reason cannot supply a solution. It suffices to say that the appearance in a constant situation of that one tooth alone is sufficient absolutely to prove a relationship between the horse and some of his hypothetical ancestors. It is only met with in the upper jaw, never in the lower, and this point is interesting, because in the tapir, which I told you is a relation, it always exists in the upper, but never in the lower jaw, and this fact may be regarded as a further link. To come then to proto and pliohippus we have an animal like a large dog, some species as large as an ass, in which the three toes no longer touch the ground. The middle one is short, broad, and strong, and takes most of the weight. The other two are drawn up like the hooflets of a cow or pig, or rather even more like the so-called 'dew claw' of a dog. Some types had altogether lost these now useless appendages, and were very equine. Its teeth are essentially horselike and its habits seem also to have been. The stages between are filled by animals which more and more resemble the horse of to-day. The other hoofs or toes are less and less marked, until you have in the horse only the splints remaining. In ancient horses these were always distinct and separate, but with us even these are tending to disappear, and often in old horses are completely joined with the cannon bone and have no separate existence. In course of time they will tend absolutely to disappear. Such briefly and very cursorily is the history from fossil bones. These changes were assisted by changes in climate in the nature of surroundings and in food. The difference between the marshy lands, where a spreading five-toed foot was useful, and the plains and uplands, where it was necessary to run on the toes, accounts for the gradual change in the foot, and the difference between the succulent plants of the river edges and the harsh grasses of the plains accounts for the small changes (which neverthless are characteristic) in teeth and in facial feature. How quickly these changes are brought about we can see in our own history. Professor Keith has pointed out that there is a great change in the skulls of men in the last 1,900 years. The eye socket has become more open and rounded at the edges, the cheek bones less prominent and angular, and these changes have been produced, together with differences in the formation of the jaws, the gums, the palate, and the teeth, by the simple act of chewing. It was the art of cooking that was responsible, for in the time of the Britons the uncooked food was exceedingly coarse, and anyone who has chewed grain from the ear will appreciate the jaw power necessary for an ancient meal. The Romans brought the art of cookery to England, and the Normans spread and elaborated it less than 1,000 years ago. Tough meat was rendered tender by boiling, and the power of the jaw was tremendously reduced, while modern machinery, with its minces, its soups, its tender meat, soft bread, cakes, and puddings, enables people to eat practically without chewing. If in 700 years this slight change could have produced a marked change in bony structures, how much greater ones would be produced in the horse during a period estimated roughly at three million years. As regards evolutionary proofs from vestigial remains in the animal itself I had intended to enlarge, but as your patience has probably been considerably strained already I will only refer to the feet, the splints, the teeth, the color, &c., very briefly. It must be stated, first of all, that occasionally by a throwback horses with more than one toe on each foot appear. Suetonius and Pliny both tell us that the favorite horse of Julius Cæsar had three toes on each foot, on which it walked as an ordinary horse does, and the other two rudimentary. The horse Bucephalus, of Alexander, was probably of the same class, and a traveller named Siebold, a biologist, has described one he saw exhibited in a market place at a horse sale in 1860. So also has Frank, the Principal of the Veterinary College of Surgery at Munich. Then, again, Heusel points out the inner splint on the forefoot quite often has the rudiment of a hoof on it, and as this does not touch the ground, and is accordingly not worn off, it often grows long, horny, and irregular, as do sometimes the hooflets of old cows. Cases such as this prove the descent of the horse from an animal with more than one toe on each foot, and still more so do the occasional occurrences of what is called a 'stag horse,' in which all four feet present extra toes and have developed hoofs which bend over as they grow like hooks. I have referred already to the splints and their common fusion with the main bone as age progresses. This often occurs about the seventh or eighth year, and in any case the splint bones of ancient horses are longer, larger, and more bulbous ended than those of our day. With regard to the teeth, the earliest types show less complicated folds of enamel and are adapted for crushing, but they gradually change into the pillar-shaped molars of the horse, which, owing to their strength and the foldings of enamel, are suitable both for grinding corn and for chopping gritty grasses. It is easy to trace in a series of drawings the gradual change from the lowest to the most complex type. Something of this may be seen in the gradual growth of the teeth in the horse of to-day. You have the incisors, or 'nippers,' first narrow from front to back and wide across, then squarer, and finally three-cornered, being flat in front and ridged behind. The horse's teeth, of course, are characteristically marked by the 'mark' which disappears with age, and also by a yellow spot in front of the pit, which lasts after the latter has disappeared. The first permanent nipper appears, I believe, from two and half to three years, and the corner tooth at five years. The 'tushes' or canines are usually found only in the male, but are rarely found in mares as well. In both cases they are survivals pointing to earlier ancestors to whom they were needful. As regards color, it is often interesting to note that by a throwback the horse resembles the zebra or the ass. Dun horses especially frequently exhibit a dorsal stripe right down their backs and a shoulder stripe or two, while the upper part of the foreleg is frequently striped crosswise. These markings may or may not exist together, but are always interesting. Finally, although the horse only has one toe it has in the leg the muscles that serve in other animals for all five toes, and although they have in many cases been adapted to other uses their existence is a strong piece of confirmatory evidence that the horse originally had five toes. When one considers that the shaggy Shetland pony, the horse of Przewalsky, the huge draught, and the clean-limbed racehorse are admitted without hesitation to be one family, it is is amusing to remember that people insist with acrimony that animals which present far less differences than these do are totally unrelated. I am sure the time will come, if it is not already at hand, when such theories will be as dead as the dodo. I have only touched lightly this very wide subject, but I hope that there has been a little, at any rate, in my paper to claim your interest, and I must thank you for your kind attention.''

LONE PINE, January 30th.—Mr. J. A. Hoklas read a paper on suitable wheats, and said that, in the event of early rains, he would sow a variety of late wheat, such as Baroota Wonder, Marshall's, White Tuscan, or Leather Head. Those were good varieties for grain or hay. In sowing late wheats, he would use 1½bush. of seed and 112lbs. of super. to the acre. Last year his Baroota Wonder had yielded 16bush. to the acre, White Tuscan and Leather Head about 18bush., and Marshall's about seven bags. He favored the floor pickling of seed wheat, using half a pound of bluestone to three gallons of water, which would pickle about 8bush. of wheat. After some discussion the Branch decided that the following varieties of wheat were most suitable for the district:—For hay—Baroota Wonder, White Marshall's, White Tuscan, and Leake's Rustproof. For grain—Red Teagle and Federation. In pickling wheat, members favored floor pickling with a solution of 1lb. of bluestone to 4galls. of water for 9bush. of seed.

SALISBURY, March 6th.—An address was delivered by Mr. G. Quinn (Horticultural Instructor) on the cultivation and manuring of citrus trees. At the conclusion Mr. Quinn answered a number of questions, and was accorded a hearty vote of thanks.

TWO WELLS, February 6th.—Mr. A. Pratt displayed several varieties of wheat in and out of chaff, which he had been selecting for a number of years. He urged upon all farmers the necessity for growing clean wheats, even though the seed cost more. There was no excuse for growing smutty wheat.

TWO WELLS, March 12th.—A paper was read by Mr. L. H. Dawkins in which he set out the conditions under which sub-agents dealing with wheat for the Wheat Harvest Board work. He detailed the routine work of weighing and issuing cart-notes, and the difficulties surrounding the reductions in prices through wheat being smutty or containing barley.

## WESTERN DISTRICT.

### SALT CREEK.

March 10th.—Present: eight members and one visitor.

**Growing Other Crops than Wheat.**—Other crops besides wheat should be grown, to enrich the land, observed Mr. W. Lee, jun., in a paper on that subject, in order that they might keep more stock and spread the harvest over a longer period. Next to wheat, oats provided the most profitable crop, and a much larger area could be sown with profit, in order to provide fodder for stock on the farm. In most years a good return of grain could be obtained, and a big stack of hay could be cut as a standby for times of drought. Another good crop to grow was peas. He had tried two acres with satisfactory results, keeping 100 fowls for six weeks. He just raked the peas and carted them as required. The fowls did the threshing. Turnips were worth growing. He sowed 1lb. of seed with the peas. He was able to get a wagon-load at a time and feed them to the pigs. Berseem in that district was a failure without irrigation. Kale did not do well.—Mr. W. Lee, sen., considered that kale should be grown by itself. Mr. W. Gale had not been very successful in growing oats.

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### YADNARIE (Average annual rainfall, 14.09in.).

March 13th.—Present: 12 members.

**Gates on a Farm.**—Every paddock should be possessed of a gate, remarked Mr. W. F. Banks in a paper entitled ''Gates on a Farm,'' and according to the position of the paddock, the sort of gate was a matter for consideration. If the paddock were so placed that the public were continually going to and fro a panel gate, or even a four-wire and stick gate should be erected. If a panel gate were provided he advised that the words "Please shut this gate" be printed on it. In most cases he had seen simply a wire or two pulled across the gateway. The wire gates with sticks were much more serviceable, but still only makeshifts. For a large farm he preferred wire and stick gates for distant paddocks only in use during the harvest time. It was unnecessary expense to have too many double gates. He advised one gate, swung on a good strainer, with a wire catch to loop over, or, better still, an iron catch. To the public the wire gate or gates broken and fixed up with wire, and not swinging, caused a very great annoyance, because they tore clothes and flesh, and wasted time. Mr. A. Spriggs said that in fixing a wire gate it was better to use the link of a chain at each end of the wire. A very satisfactory sheep gate could be made with two sticks, three wires, and a piece of netting wire with two or three droppers to prevent the wires becoming tangled. Mr. J. Deer advised the use of a manufactured gate on roads extensively used by the public. Mr. A. J. Hutchinson considered it unnecessary to fasten the road gate of a paddock unless the paddock was to be cultivated. Mr. J. H. Kruger said that that was the second time the paper had been read, and since the first reading there had been an improvement in the gates in the district. Mr. W. L. Brown considered that the main gates should be the best the farmer could afford.

KOONIBBA, February 1st.—Discussion took place on the occurrence of black rust and takeall in wheat, and the means to be adopted to prevent or destroy them. Opinions differed as to the efficacy of bluestone pickle for the prevention of smut, members relating their experiences under varying conditions.

KOPPIO, March 6th.—Mr. J. Newell, the Chairman, presented the fourth annual report on the work at the experimental plots. The three plots, which were ¼ acre in extent, were ploughed on April 22nd, under rather dry conditions, and were drilled on May 3rd, with 2bush. of Calcutta Cape oats and 1cwt., 2cwts., and 3 cwts. of mineral super. per acre. The land was harrowed after drilling. The crops came up fairly evenly, but suffered through excessive wet, and became rather patchy. Growth was fairly even, but slow. Crops harvested on December 9th. Results:—Plot 1—1cwt. super. and 2bush. oats per acre, yield 33 sheaves, equal to 329lbs. Plot 2—2cwts. super. and 2bush. oats per acre, yield, 30 sheaves, equal to 287lbs. Plot 3—3cwts. super. and 2bush. of oats per acre, yield 30 sheaves, equal to 316lbs. In the discussion which followed there was a consensus of opinion that about 1cwt. of super. per acre was the most profitable dressing for most of the land in that district.

YALLUNDA, December 2nd.—Mr. T. Forrest initiated a discussion on the question how competition with other countries would be carried on after the war.

YALLUNDA, March 8th.—During the course of a meeting which took the form of a social evening, Mr. F. Olston (Chairman) delivered an address on the advantages which had been reaped from the work of the Agricultural Bureau, and he appealed to all to become members. Mr. R. B. Jenkins initiated a discussion on experimenting. Each district, he pointed out, required different treatment, and an experimental farm in any one district would not answer the purpose. It would be too expensive to establish experimental stations in every district. Something was lacking in the soil, and super. did not yield the return it should. They did not seem to have the right class of manure for that part of the country. He advised growing oats, getting rid of mallee shoots, and keeping sheep. Mr. Gardiner said that some plant foods were essential, and experimental work should be undertaken to ascertain what was lacking in the soil. Mr. Trigg advocated mixed farming. Mr. Proctor said that experiments were required on the poor soil, and the farmer could not afford to experiment, because it took all his time to make a living. Mr. Roberts said that the Government should assist individuals in experimenting. Members were generally of opinion that experimental plots should be established in each district, with Government assistance.

YEELANNA, March 3rd.—Mr. R. Smith read a short paper setting out a few reasons why dams should be fenced. In the first place, the fencing of dams kept the water clean. If a farmer allowed his team, returning from work, to go into the dam and drink, one by one, the water was so stirred up and muddy for the later ones that they did not care to drink, with the result that they lost condition. The dam should be fenced and the water elevated to troughs by hand pumps or windmill, the latter being more useful to the farmer whose house and garden were situated near the dam. An important reason why dams should be fenced was that horses frequently passed blood worms into the water with their droppings, and other horses drinking the water sucked up the worms with it. The water in a dam, if fenced, was fit for human consumption, but not otherwise.

# EASTERN DISTRICT.

## EAST OF MOUNT LOFTY RANGES.)

### MONARTO SOUTH (Average annual rainfall, 14in. to 15in.).

March 10th.—Present: 10 members.

Quantity of Wheat to Sow.—The principal considerations in determining the quantity of wheat per acre to sow, declared Mr. J. Hartmann, in a paper dealing with that question, were the size of the grain and the variety. The wheat should be clean, and should have been put through the grader or winnowing machine. All rubbish, cracked grain, or barley should be removed. The grading of the wheat mattered less than cleaning it thoroughly of weed seeds and barley. With large, plump grain 20lbs. extra per acre should be sown. The early sorts required to be sown more thickly than the better stooling varieties. For average grain, 1bush. to the acre was sufficient, but some sorts, like Golden Drop, required at least 1½bush. per acre, especially if sown for hay. At least 1½bush. of oats per acre should be sown, and with barley 2bush. were not too much. Barley should be pickled at least one week before sowing, and it would then run evenly through the drill.—In the discussion, some members were of opinion that the quantities mentioned were correct for wet seasons, but in dry seasons considerably less would prove more profitable. In regard to barley, the opinion was that from 1bush. to 1¼bush. was ample.

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### RAMCO.

February 5th.—Present: nine members.

An Ash Distributor.—The question of how to dispose of the cuttings after pruning, remarked Mr. G. Jackman in a paper on an ash distributor, was one which had caused considerable thought and discussion. So far as that district was concerned, there appeared to have been very little effort made to successfully deal with the subject. The fact that each year many pounds of good ash fertiliser were lost to the ground, owing to there being no proper means to distribute the ash after burning the cuttings was apparent. If that could be remedied growers would find a great improvement in the condition of their orchards. He had to admit that it was no pleasant thought to him to have to allow the potash to be lost each year, and after considerable thought he devised a means with the material at his disposal to overcome the difficulty. For the past three years he had been using the machine, and had found it very satisfactory. There were no very great difficulties to be overcome in the making of a suitable implement. While not claiming perfection for the device, and admitting that a more scientific implement could be made, the one he was about to describe would fulfil the requirements of growers in that district, and would be found to be very durable. He first procured a 400-gall. malting tank, then a carriage upon which the tank was placed; that could be made from an old V-shaped scarifier frame with wheels attached, three of which were required. The two back wheels required to be fixed on the inside of the frame to prevent them coming in contact with trellis posts or trees. The bottom of the tank was partially removed, and a grating laid across the aperture. To prevent the heat, which was very great, injuring the vines or trees, a sheet of iron was fixed on each side and in front, the back being left open to allow the cuttings to be more easily put in the tank. It was necessary to put in a good mallee root before starting to burn the cuttings, because the root caused a good heat, and when well established, the cuttings, no matter how green, would burn very readily. On account of the heat it was necessary to have the horse about 10ft. away from the distributor. That could be easily done by using the ordinary trace chains. Mr. E. J. Burton said that he had assisted in working one of the machines at Renmark. It was large, and had four low wheels. It burned as fast as two men could feed it. Mr. F. Lewis commended Mr. Jackman's idea, provided it would pay. Mr. F. G. Rogers suggested that it might pay for several to co-operate. Mr. Jackman said that the machine did a clean job, and gave some manure, if only a little. Material and building cost £3 10s. Members considered that the machine would pay on a 15-acre block.

## MILANG.

March 10th.—Present: 37 members.

**Handfeeding Sheep.**—In a paper on the handfeeding of sheep Mr. T. B. Moss said that he proposed to deal with the handfeeding of sheep as a supplement to natural feed at such times as natural grasses were scarce. The majority of farmer's flocks in that district consisted principally of breeding ewes, which were kept for the purpose of raising market lambs. To obtain the best results from those ewes it was necessary that they should be kept in good strong condition throughout the season. Feed grown on cultivated land consisted mainly of dandelion, clover, and like grasses, which, though they produced abundance of feed in the spring, as soon as the dry weather came were quickly cleaned up or blown away, leaving little or no dry feed to last over the autumn. There was then the stubble feed, but when that was finished (usually about the end of March, should the autumn rains hold off) the sheep experienced a trying time until the green feed came, and it was then that the benefit of handfeeding was exemplified. Some farmers, when feed became scarce, sold a portion of their flock to save the others, necessitating buying again later in the season at a price considerably in advance of that at which they sold. Others, not wishing to sacrifice their ewes, kept them all, and allowed them to pick a living as best they could. Consequently the ewes became poor and weak, resulting in many losses at lambing time, of both lambs and ewes. Both of those practices entailed a serious loss to the farmer which could be easily avoided by a little feeding to tide them over the bad time. There were various ideas about feeding sheep, but he preferred to supply chaff and oats mixed. Ewes should be fed on somewhat similar lines to milk cows, and though chaff alone was good for them, the addition of a little bran or oats effected a marked improvement. Last year he fed to 100 ewes one bag of chaff and about a bushel of oats per day, and found that they kept their condition well on it. By handfeeding for two or three months of the year a farmer could keep at least 30 per cent. more sheep than without feeding and make a good profit thereby. The cost of feeding 130 sheep for three months, at the rate of 1lb. of chaff and ½lb. of oats per sheep per day would be as follows:—Five tons of chaff, at 50s. per ton, £12 10s.; 136bush. of oats, at 1s. 9d. per bushel, £11 18s.; total, £24 8s. The return from the 30 extra ewes kept (at say 25s. each for lamb and wool) would amount to £37 10s., leaving a balance of £13 2s. in favor of handfeeding. That was a very moderate estimate, and was given as a possible average for a number of years at the present prices for feed, and for lambs the proposition would show a very much larger profit. Several different kinds of feeders might be used. If feeding on grain, light wooden troughing could be made fairly cheaply, but if feeding chaff something bigger was required. A useful feeder might be made from bags threaded on two wires and stretched between two posts or trees, with stakes driven on either side at intervals of about 6ft., and the wires tacked on the top of them to prevent the feeder sagging. Feeders should be about 25yds. long for each 100 sheep, allowing them to feed on both sides, and should be about 18in. high to the top. The sheep would not then walk in the feeder. One of the essentials for sheep was a good supply of water. Sheep would do well in the dry weather on a small amount of feed if they had plenty of water, but on the other hand they might have any amount of feed, and if they were short of water they would quickly lose condition. Sheep would do best if they had water to run to when they wished without being driven. About 12 months ago he purchased 100 two-tooth ewes in lamb, and as the season continued dry he was forced, about April, to commence hand feeding them. He found that by giving them the quantity of feed above stated they kept in good condition. He had not the least difficulty with them at lambing time, and they reared 98 lambs, which returned £114 6s. 8d. The returns for wool were £54, a total of £168 6s. 8d., or an average per sheep for the 100 ewes of £1 13s. 8d. Considering that those were maiden ewes, that was an excellent return, and was due to the ewes being kept in good condition right through. That could not have been accomplished without handfeeding.

## NARRUNG (Average annual rainfall, 17in. to 18in.).

February 3rd.—Present: 11 members and one visitor.

**Win the War Production.**—Mr. G. G. Hackett read a paper entitled "Win the War Production," in which he advocated increasing the yield of the dairy herds by better methods and better feeding. Pig-raising should be more extensively practised, and with the scarcity of sheep and cattle, pork and bacon must remain in good demand, and realise good prices. Even at low prices the pig gave a higher return on the capital invested than most other animals. Farmers should also experiment in wheats and manures to obtain more profitable returns, and the area sown for potatoes should be extended. Increase in the production of cattle and sheep should be a feature in the farmer's win the war enterprise. Another reason for the making of a special effort was that the purpose of assisting those who returned to their district from the front should be kept in view. The returned soldiers would require all the help which could be given them, and if that district could show a greater capacity for improvement in agricultural and other products there was every reason why land should be obtained for the returned soldiers to enable them to secure permanent homes in that district. Mr. Goode considered that it was necessary to increase the production of foodstuffs. Although the district's main line was dairying, butter was an essential, and an important factor in supplying a nation's wants.

## PORT ELLIOT (Average annual rainfall, 20.33in.).

February 17th.—Present: nine members.

**Dipping Sheep for Tick and Lice.**—The law in regard to undipped sheep should be enforced, remarked Mr. Hamilton Welch in a paper on dipping sheep for tick and lice, because undipped sheep caused the spread of the vermin. It was a good plan for one man to construct a dip, and for as many owners as possible living within a few miles to make use of it, paying so much per hundred sheep. A useful pit should be 30ft. long, 5ft. deep, and 22in. wide on top, tapering to about 1ft. at bottom. The entry should be steep and sudden, with a bevelled slab built in the wall and made slippery, so that sheep could not hold their feet, and consequently fell into the pit when endeavoring to walk upon it. The outlet should gradually slope upwards, with cement steps to enable the sheep to walk into the draining yard. The walls of the pit might be built of stone or brick, cemented over to make them watertight. Sand or gravel was best for a foundation; clay was liable to swell and cause cracks. The receiving yard should be fairly large, according to the quantity usually owned in the district, with two or three smaller yards, finishing up with a small yard tapering into a race, where the sheep ran along in single file. One man and a boy could then regulate the pace at which they entered the dip, preventing too many from jumping in at a time, otherwise they were liable to drown one another or endeavor to breathe under water, which would cause death by poison. Another man, with a pole and small crosspiece attached to the end would push each sheep under, ensuring the submersion of each sheep and regulating the pace at which the sheep should swim through. At the outlet there should be two draining yards, a fence with a gate dividing them, enabling the first pen of dipped sheep to pass on to the second yard. By the time the second lot was put through the first lot would be nearly dry and about ready to turn out. When that lot was dry the second could be passed up, and so on. Convenient yards would measure 10yds. long by 4yds. wide, divided into two. That would hold about 60 sheep in each pen. The floor should be of brick with cement over the top, with a slope towards the dip, either draining in the centre or on the lower side, where a small wall was necessary to prevent overflow. The floors should be swept frequently to prevent too much manure washing into the dip. All sheep, including lambs of any size, from two weeks to one month, should be dipped after shearing. That would prevent the tick from laying their eggs in the wool. Scientists described the egg as a "pupa," or an encased young tick, which it was said would only live five days without food. He did not believe that dipping sheep would actually kill the tick, but it most certainly drove them off the sheep, and they died from starvation, because they could not live in the wool when sheep had been thoroughly dipped. To prevent the spread of tick it was necessary to dip early, dip well, and dip every sheep and lamb on the farm and see that one's neighbors did likewise. A few undipped sheep would spread tick through a flock, because the insects could live upon the sheep a few months after they had been dipped. The flock should be examined occasionally lest they should come in contact with undipped sheep. Sheep should not be dipped whilst thirsty or very hot.

## STRALTHALBYN (Average annual rainfall, 19.28in.).

March 6th.—Present: 27 members.

**Ploughing and Cultivation for the Growing of Wheat.**—Where a farmer was chiefly dependent for his living on the proceeds of hay and grain, premised Mr. T. D. Finey, in a paper on ploughing and cultivation for the growing of wheat, it was absolutely necessary to practise a systematic course of fallowing. In regard to ploughing, most of the work should be done with a set implement, he said. Too many furrows resulted in unevenness in depth and hard patches. The narrow furrow slice was more often than not set on edge instead of being completely turned over. That was a most objectionable feature, and could not produce good results. He advised the throwing out of those ploughs, because they were unprofitable, and they should get possession of a good working plough, certainly a set one, if the clear acreage warranted it. A good sweeping mouldboard should be used, ensuring a complete turnover, with not more than five furrows, 8½in. or 9in. wide, with sufficient horse-power to plough down to 5in. or 6in., according to the depth of the subsoil. It was impracticable to do good work with less strength than 1½ horses per furrow, because in any stiff land the horses tired. If the subsoil should be at a shallow depth it would not hurt to turn up an inch of clay, because it soon worked up with 3in. or 4in. of surface soil, and tended to give greater depth in shallow places. After ploughing, if the land were likely to drift with the wind, the harrow should not be used. If there were no danger of that it should be harrowed once only immediately after ploughing. He was averse to using the harrow as a means of cultivation. They seemed only to fine down the surface, which was likely to set hard after a moderately heavy rain, a condition exactly opposite to the good derived from worked fallow. The cultivator should be used constantly, and they should keep on scratching as often as possible with it, not only when the paddocks were dirty, but whenever time permitted. The farmer should have a good idea as to the depth of his ploughing in different parts of the land under fallow, and at the first scarifying he should work as deep, or almost as deep as the plough. Subsequent working should be only 3in. to 4in. deep. The object in going deep the first time was that, under many conditions, ploughing was rough, and it would often take the sods a considerable time to set down closely and firmly, which was the first factor necessary to the formation of a perfect seed bed, and the following working at a shallower depth did not disturb that bed. It should not be forgotten that good, deep ploughing and cultivation in the first place tended to deepen the soil, and so allow the roots to draw moisture at a greater depth than was the case where the land was scratch ploughed. A good depth also to a great degree resulted in uniformity and eveness amongst cereal crops. He then proceeded to deal with the important part played by oxygen, nitrogen, and hydrogen in plant growth, and explained the necessity for allowing an abundant supply of air to reach the roots of the plant. Cultivation, he stated, was the chief factor in effecting a storage of moisture for the crop. By loosening the land the rainfall was prevented from running to waste. The spaces between the particles of worked land were far greater than in set land, and absorbed and retained a much greater quantity of moisture before becoming thoroughly saturated. As most of the useful rain fell in showers, with perhaps long intervals between, the growing crops were almost entirely dependent upon the retaining properties of the soil. He then quoted from an article on "Tillage and the Soil for Wheatgrowing," by Mr. W. J. Spafford (*Journal*, December, 1916, p. 369).

### URAIDLA AND SUMMERTOWN (Average annual rainfall, 44.35in.).

March 6th.—Present: six members.

**Improving and Fertilising the Soil.**—Mr. C. W. Kessell, in a paper on improving and fertilising the soil, expressed a high appreciation of the value of stable manure, not only from the point of view of its fertilising properties, but also because it made the soil friable and easier to work. Stable manure should contain straw or bedding of some kind that would absorb the urine, which contained larger proportions of nitrogen and potash. Two acres of land well fertilised were better than four or five acres of inferior land, involving the employment of less labor and giving better results. In addition to manuring, the land should be worked deeply, and then receive continual surface cultivation. A proper circulation of the air let into the soil was as important as any other factor of the plant growth, and also helped to supply proper plant food. The soil could not be worked too much. It was necessary to use artificial manures in conjunction with stable manure to stimulate and give leaf production. Stable manure should be well rotted, if possible, in order to prevent the germination of the seeds which it might contain. Manure that was carted on to the ground in the hot weather should be ploughed in as soon as possible, otherwise the ammonia, which was one of its chief constituents, would be lost. Manure from cattle and swine contained a larger percentage of water than other animals, and was called cold manure. The manure from horses and sheep and poultry being relatively dry, fermented easily, and was called hot manure. Some crops, such as cabbages, lettuce, &c., needed ammonia or nitrate of soda as well as stable manure or bonedust to help them mature. Some soils should not be worked if too wet, because they only puddled and set too hard. Soils which were ploughed and left through the winter should just be ploughed and left to lie as they were turned over, so that when the weeds came up the ground could be cross harrowed. Otherwise, if harrowed and rolled, the ground would set, and the weeds were not so easily moved by the harrows. In the hot weather mulching helped to keep the moisture in the soil, and kept the ground from setting too hard when watered, and became free and loose to work. The ploughing in of green crops as manure was another method of improving the soil, and was not generally practised, but when a supply of stable manure was not available, that would be a considerable help. Peas were one of the best green crops to grow. It was necessary to sow one and a half bushels to the acre in spring or autumn..

MOUNT COMPASS, February 10th.—Members met at the garden of the President (Mr. M. Jacobs) and made a tour of inspection of the local gardens, which proved interesting and instructive. Later on, at the residence of Mr. A. H. Simons, members discussed what they had seen during the afternoon, and general satisfaction was expressed at the information which had been gained.

## SOUTH-EAST DISTRICT.

### KONGORONG.

March 6th.—Present: eight members and four visitors.

A paper was read by Mr. C. T. Atkin on the garden on the farm, in which he advocated the establishment of a vegetable garden on every farm. A windbreak was also essential to protect the garden, and for that purpose titrees should be used in the same manner as a paling fence. There should be a fair depth of soil and plenty of water should be used in conjunction with suitable fertiliser. A heavy dressing of stable manure dug in once a year proved very effective. Members generally agreed that a garden was of no use without a windbreak, and that the garden should be dug to a depth of 18in. The experience of the writer of the paper went to demonstrate that melons, pumpkins, peas, beans (broad and French), cabbage, cauliflowers, carrots, parsnips, lettuce, red beet, spinach, tomatoes, cucumbers, artichokes, radishes, and rhubarb did well in that district. Gooseberries, loganberries, strawberries, and raspberries could also be profitably grown.

### KYBYBOLITE (Average annual rainfall, 22in.).

March 8th.—Present: 13 members and one visitor.

Vegetable and Fruit Growing on the Farm.—The first consideration in vegetable growing, observed Mr. H. Douglas, in a paper on vegetable and fruit growing on the farm, was to consider the class of land available. Land of a peaty nature was pre-eminently suited for all vegetable growth. Secondly, there was good chocolate loam, with a good clay subsoil to retain the moisture, and thirdly a sandy loamy soil, which was good for potatoes and onions, where water was available. In regard to the time of planting, what to plant, and how to plant it would be well, commencing in August, to sow peas (Yorkshire Hero for preference) from the first to the middle of the month. Carrots, parsnips, and beet should be sown, the two last-named in quantities to last all the season, because what was known as middle crop was not suitable for that district. Cabbages might also be planted and continued at intervals of a month until the end of October. At the end of August turnips and swedes should be planted, sowing the latter in small beds, suitable for requirements. Lettuce should be put in in small plantings until the end of September, and kept growing vigorously, because success depended on quick growth— say eight or nine weeks. Frequent applications of ammonia or nitrate of soda were very beneficial. French beans should be sown in November to avoid the frost. Marrows, trombones, cucumbers, &c., should also be sown. Heavy dressings of stable manure were suitable for these, with plenty of water, because the ground in that locality dried up very quickly. Constant watering was necessary, and constant applications of fertilisers; small quantities and often being better than one heavy dressing. Potatoes might be planted at the end of October. In planting the ground should be given a good heavy coat of stable manure, which should be ploughed in, say nine months before sowing time. The soil should be harrowed and scarified to produce a fine tilth. When planting furrows should be hoed 2ft. apart, and 1ft. between the setts. The land required to be ploughed deeply, and should be planted outside of the furrow in order to have loose soil beneath the set, which should be between 4in. and 5in. deep. When planting a handful of bonedust and potash should be sown to each step along the sets, the mixture being in the proportion of half a ton of bonedust to 1cwt. of potash. A site for an orchard should have a gradual slope to allow for natural drainage, with a shelter from prevailing winds. If no natural shelter were available some quick-growing trees should be planted such as pines, which would achieve the twofold purpose of providing shelter as well as timber for boxmaking, available in say 35 years from planting. The trees should be planted so as to be square all ways so that they could be cultivated by horse power, and thus save labor in keeping in condition. The holes should be 3ft. square and 18in. deep. In planting the young trees the roots should be spread out evenly, and there should be a small elevation in the middle of the hole, raising the tree slightly and giving the roots a downward tendency. The ground around the young trees should be trampled in fairly firmly, and the trees should be staked to prevent young roots from loosening by swaying about. If planting apples the trees should be obtained from a reliable nurseryman, and planted on blight-proof roots double worked. If planting pears they should be worked on seedling stocks, because they made better trees, and were not so subject to throw suckers. The seeds of Winter Nelis were best. If cherries were set the seeds of Mazzard were best. The following varieties of apples were suitable for home consumption:—Cooking—Mot's Royal, Empress (early), Dunn's Seedling and Stone Pippin (late); early eating—Irish Peach (very good, only subject to *fusicladium*), Williams Favorite, Gladstone, and Gravenstein (all for home use), following on with Cleopatra, Jonathan, Rome Beauty, Sturmers, and Worcester Pearmain (all suitable for export). As regards harvesting the crops, a fairly safe method was to cut the fruit, and if the pips were dark in color, approaching black, it was safe to pick them. Some fruits were better flavored if picked on the green side and then allowed to ripen on shelves, as for instance, the Duchess pears. Apricots and peaches should be picked on the firm side in order that they might be carried without crushing. A judicious thinning of fruit would give a better marketable article and quite as many cases. For success it was necessary to cultivate well, spray frequently, and manure judiciously.

## MUNDALLA.

February 14th.—Present: seven members.

**Reaping a Crop.**—As soon as a crop of wheat was fit to harvest, remarked Mr. J. H. Windebank in a paper on reaping a crop, the machines should commence to reap it at once, because a crop harvested as soon as it was ready was far more easily handled and entailed far less waste than if allowed to become over ripe. That was particularly the case with oats and barley. In fact, oats could be stripped a little on the green side, as long as the bags were not sewn up for a day or two. The paddock should be always reaped the longest way, and the drilling should not be crossed more than was absolutely necessary, because the ground set so hard that considerable grain was lost off the comb, besides being very rough on the machine. The bags should be sewn up as soon as filled, and carted straight away, because wheat if left out in the sun for a few days would lose in weight from 6lbs. to 8lbs. per bag. A crop might be harvested with a reaper and thrasher, reaper and winnower, binder and thrasher, or a complete harvester. He preferred the complete harvester because it saved labor and wheat.

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CLARENCE GOODE,
*Minister of Agriculture.*

# POINTS FOR PRODUCERS.

**The Fruiting of Trees in Consecutive Seasons.**

The view that fruit trees tend to bear heavily and lightly in alternate seasons is often made the basis of a recommendation to thin a heavy crop borne one year in order to obtain a better crop the succeeding year, says the Bulletin of Agricultural Intelligence and Plant Diseases of the International Institute of Agriculture in reviewing the fifteenth report of the Woburn Experimental Fruit Farm. It appears, however, that the tendency towards alternate cropping, as it may be called, is very feeble, and that there is at the same time an equally potent tendency towards consecutive cropping; that is, that a tree bearing particularly well or badly one season, will probably do the same in the succeeding season, whilst the chief factor in determining good or poor bearing is undoubtedly the atmospheric conditions, and not any innate tendency of the individual tree to either alternate or consecutive fruiting. The existence of a tendency towards alternate bearing is indicated by the fact that young trees, if prevented for four years from bearing after they have come to the age for so doing, will bear exceptionally heavy crops as soon as they are allowed to bear. But it was only in one series of experiments on some 300 young apple and pear trees during the seasons 1899 to 1903 that such a tendency was actually recognised. Observations on the same trees made when they were younger, during 1894 to 1897, showed that their tendency then was towards consecutive bearing, and in another case of apple trees where the observations apply to over 5,700 instances, extending from 1904 to 1915, the tendency has been, with only one slight exception, towards consecutive bearing. But this tendency affects the results to only a slight extent, about 12 per cent., the remaining 88 per cent. being attributable to peculiarities of the season, and not to the individual behaviour of the trees. It is noticeable that the preponderating influence of external conditions become more marked as the tree is left more to its natural habits, *i.e.*, as it is less pruned, and also as the age of the tree increases; and it is more marked in the case of trees on the paradise stock than in those on crab stock, this being doubtless a consequence of the latter coming less rapidly to full maturity than the former.

If in a plantation consisting of a large number of individual trees, whether of the same or of different varieties, it is found that good and bad fruiting seasons alternate with each other, it is evident that such alternation must be caused by some conditions affecting all the trees alike, and not to any tendency to alternate bearing exhibited by the individual trees; for such a tendency, if it existed, would be exhibited by different trees in different seasons, and the effect of it would be to bring about uniform production in the plantation as a whole. The alternation of good and bad years has been uniformly exhibited to a most marked extent in some plantations available for observation over a period of 20 years. As the injury to these crops has nearly always been due to spring frosts, it is evident that the alternation of good and bad years is due to the tendency of such frosts to occur alternately in consecutive seasons.

### Where do Bloodworms Come From?

One of the perennial inquiries of correspondents is for information as to the origin and treatment for bloodworms. Ignoring the query "which came first, the egg or the worm?" the Veterinary Lecturer (Mr. F. E. Place, B.V.Sc., M.R.C.V.S.) says that to-day, the bloodworms develop from eggs laid in the horse—a single bloodworm is capable of depositing anything up to 30,000 eggs. These pass out in the dung, and develop in moist spots. The newly-hatched worms are taken up in the food or water by other horses, with the result that infection rapidly spreads. Preventive measures are simple and effective—they consist in fencing the dam, liming the worm-infested pasture, and cleaning the water trough.

### Sulphur in Haystacks to Prevent Damage by Mice.

Among the various expedients suggested as means of preventing the damage of haystacks by mice, that of spreading sulphur through the hay has received a good deal of attention. With a view to ascertaining the wisdom of adopting this practice the Director of the Department of Chemistry (Mr. W. A. Hargreaves, M.A., D.Sc.) was communicated with. In replying Mr. Hargreaves said, "I would not recommend the use of sulphur for preventing mice in haystacks. If the sulphur is efficient it is probably due to its oxidation to sulphur dioxide, and if the oxidation is rapid there will be a strong risk of spontaneous ignition of the sulphur and the carbonaceous matter."

### Five Millions a Year.

In 1915, according to a memorandum on the organisation of Scientific Research Institutions in the United States of America, the expenditure of the Department of Agriculture in that country for the year 1915 was £5,330,000. There are about 15,000 employees in the Department. Nearly 2,000 persons are engaged in scientific investigation and research, 1,400 in demonstration and extension work, and 700 in administration and supervising work.

### Recent Development of German Agriculture.

A prefatory note by the Right Hon. the Earl of Selborne, K.G., G.C.M.G. (President of the Board of Agriculture and Fisheries, London) to a memorandum dealing with the development of German agriculture in the last 30 to 40 years, and prepared by Mr. T. H. Middleton, C.B., reads—"It has been part of my duty at the Board of Agriculture and Fisheries to make a study of the agriculture of Germany, and in the course of my work it became apparent to me that if agriculture had made no more progress in Germany than it has in the United Kingdom during the period 1895 to 1915, the German Empire would have been at the end of its food resources long before the end of the second year of the war, and that, as a matter of fact, the war was being fought by it just as much on an agricultural as on a military organisation of the nation."

In summarising the results of his investigations Mr. Middleton, under the pertinent title of "Some Lessons," mentions that much attention has been given to organising production from German soil. The credit system is well adapted to promote good farming; co-operation is largely resorted to. Education has been well developed; societies have been created to provide leadership.

Germany, and especially Prussia, has developed a most efficient system of agricultural education. The policy aimed at was in the first place to secure facilities for the study of agriculture in institutions of university rank. It was recognised that before suitable instruction could be provided for small farmers there must first of all be careful study of methods and principles, such as is only possible in institutions possessing a large and well trained staff. Up to 1910 some 65,000 agriculturists had been trained at Prussian universities or colleges. The influence of the farming of these men on the cultivation of German soil cannot be proved by figures, Mr. Middleton concludes, but there can be no doubt that the readiness which German farmers have shown to adopt the aids to production which the twentieth century has placed within their reach is due to the leavening of the mass by educated agriculturists.

### Government Butter and Bacon Factory.

With the object of encouraging the development of the dairying industry the Government has intimated its intention of establishing a butter and bacon factory at Port Lincoln. In announcing the Goverment's determination the Minister of Industry (Hon. R. P. Blundell, M.P.) stated that they could not look for any profit from the Port Lincoln factory for at least 12 months. The expenditure would be incurred by the Government to ensure that the settlers should have an opportunity to dispose of their products. It was anticipated that a large number of people in the vicinity of Port Lincoln would in future go in for dairying and pig raising, as the land was very suitable for the purpose.

### Strangles.

Strangles, being due to a germ, is easily communicated from one horse to another. By far the commonest way of contamination is through horses drinking at common water troughs, or being stabled together in stables in which affected horses have been. Therefore it is advisable, says the Government Veterinary Lecturer (Mr. F. E. Place, B.V.Sc., M.R.C.V.S.) in the case of teams carting wheat, and so forth, for the teamster to carry a bucket, and obtain water from a pure source. In addition, it is wise to put the horses in an open yard rather than in a close, ill-ventilated stable when away from home.

### Buying a Bull.

"What are the principal features to be considered in choosing a Shorthorn bull of milking strain?" This question was referred to the Veterinary Lecturer, who says:—"First and foremost a good milking record on both sides—bulls that have got milkers, milkers that have bred bulls. The young bull should have all the masculine points capable of development, and be massive and short-legged for his age; forehand, loins and quarters should be well developed. Teats on scrotum are often found in good milking strains. The muzzle should be flesh-colored, not black. Color yellowish red, with or without white; and if roan, yellowish, especially inside ears and on cod. White is to be avoided in South Australia, as the color is attractive to insect pests; and white beasts, as a rule, are not so sturdy as colored. The yellow or orange is necessary for a good butter-fat return. In England there is a return to the 800gall. cow, well fleshed, and of real Shorthorn character.

### Imports and Exports of Fruits, Plants, Etc.

During the month of March, 1917, 9,405bush. of fresh fruits, 10,638bush. of bananas, 1,046pkgs. of potatoes, 39pkgs of plants, seeds, and bulbs, and 1,880 empty wine casks were examined and admitted at Adelaide and Port Adelaide under the Vine, Fruit, and Vegetable Protection Acts of 1885 and 1910; 286bush. of bananas (over ripe) were destroyed, 113 empty wine casks were fumigated, and 297bush. of apples were returned on account of codlin moth, &c. Under the Federal Commerce Act 12pkgs. of fresh fruits, 13,042pkgs. of dried fruits, 453pkgs. of honey, and 2pkgs. of seeds were exported to oversea markets. These were consigned as follows:—For London, 12bush. of apples, 12,942pkgs. of dried fruit, and 453pkgs. of honey; for New Zealand, 100pkgs. of dried fruit and 1pkg. of seeds; for Batavia, 1pkg. of seeds. Three lots of seeds were rejected on account of very low germination. Under the Federal Quarantine Act 592pkgs. of plants, seeds, and bulbs were examined and admitted from oversea sources. Three consignments of seed were cleaned by grader on account of the presence of weed seeds.

During the month of April, 1917, 8,464bush. of fresh fruits, 8,320bush. of bananas, 2,239pkgs. of potatoes, 4pkgs. of onions, 456 empty wine casks, 48 empty cases, and 56pkgs. of empty bags were examined and admitted at Adelaide and Port Adelaide under the Vine, Fruit, and Vegetable Protection Acts of 1885 and 1910; 16bush. of bananas (over ripe) were destroyed, 34 wine casks and 56pkgs. of empty bags were fumigated. In addition 260 empty cases were returned to New South Wales. Under the Federal Commerce Act 17,793pkgs. of dried fruit, 85pkgs. of preserved fruit, and 735pkgs. of honey were exported to oversea sources. These were consigned as follows:—For Liverpool, 17,596pkgs. of dried fruit, 10pkgs. of preserved fruit, and 735pkgs. of honey; for New Zealand, 197pkgs. of tine Act 881pkgs. of plants, trees, and bulbs were examined and admitted from oversea sources.

# INQUIRY DEPARTMENT.

**Any questions relating to methods of agriculture, horticulture, viticulture, dairying, &c., diseases of stock and poultry, insect and fungoid pests, the export of produce, and similar subjects, will be referred to the Government experts, and replies will be published in these pages for the benefit of producers generally. The name and address of the inquirer must accompany each question. Inquiries received from the question-boxes established by Branches of the Agricultural Bureau will be similarly dealt with. All correspondence should be addressed to "The Editor, *The Journal of Agriculture*, Adelaide."**

## VETERINARY INQUIRIES.

[Replies supplied by Mr. F. E. PLACE, B.V.Sc., M.R.C.V.S., Veterinary Lecturer.]

[Extraordinary pressure on space has rendered it necessary to very considerably curtail the inquiry department. Replies to those questions of more general interest only have been published; however, every query received has been replied to through the post.—ED.]

"E. W. P.," Koppio, reports the death of lambs, and asks whether stinkwort is responsible.

Reply—Stinkwort can hardly be classed as a poisonous plant, but it is a highly indigestible one, as the portion sent shows; but if sheep have other food inside them when they go on to it, and wet is avoided, they do not come to much harm. Parasites such as stomach worms, cause anaemia, and they cannot then digest what otherwise they would. When lambs seem unwell, they will benefit by a few days course of Cooper's worm tablets.

"A. H. N.," Quorn, has a foal, three months, which is getting crooked in front legs.

Reply—The symptoms point to rickets, due possibly to constitutional weakness. Do not do anything to the legs beyond rubbing them daily with a mild embrocation such as can be procured at any store, diluted to half its strength with olive oil. Give a tablespoon of compound syrup of phosphate of iron in a little milk twice a day.

"E. J. M.," Mount Wedge, has a chestnut gelding, subject to attacks of colic.

Reply—This is often the case with chestnuts. Give 10 drops tincture nux vomica on tongue morning and evening for three weeks, and the attacks will diminish in severity. If severe, give a teacupful of spirit, preferably gin, half a teaspoon of essence peppermint, and ½ pint warm water.

"J. F. D.," Burnside, Strathalbyn, has sheep losing condition. .

Reply—The reason sheep do badly in the Meningie scrub in winter is that they suffer from large parasites such as worms and flukes and microscopic ones, such as sarcosporidia, and the best way of treating them is to send them right away for a change of pasture for some months. A lick that may do some good would be salt 3lbs., sulphur 1lb., sulphate of iron 1lb., slaked lime 1lb., bonemeal 1lb., and molasses meal 4lbs. per 100 sheep. When sheep are noticed to be bad dose them for a few days with Cooper's tablets.

"R. W. R.," Rockleigh, desires information in relation to rye as feed for horses.

Reply—In some parts of the world, Russia for instance, rye is fed to horses as grain, but it is not to be recommended, because of its difficult digestion. Still, if it is a case of necessity it can form a third of the grain ration crushed, but it should be given in very small quantities to begin with; at least a fortnight should elapse before it is given in quantity.

"R. H.," Monarto, has a bull with lump inside right hind leg below knee (? hock) as big as a man's fist; seems to contain proud flesh.

Reply—Apparently a fibrous tumor, resulting from an injury. If it is possible to tie a piece of whipcord tightly round the root of it, do so, and let the growth slough off. If this cannot be done throw the bull and sear it off with a hot iron. A shovel makes a good implement for the purpose, but as it holds a big surface of heat, hold a cold shovel between it and the leg to prevent charring sound flesh. Put equal parts of bluestone and alum in a tin in the oven for an hour or two till burnt to a fine powder and dress daily with this till healed. If the powder falls off dress lightly with tar before applying.

''M. E. W.,'' Mount Wedge, has a mare which went very lame off front leg, suddenly while wheat carting; swelling between knee and shoulder; now on knee.

Reply—Failing any injury to the foot, such as a nail picked up and buried in the foot, which should be carefully searched, the symptoms seem to point to acute synovitis, and the following treatment may be tried:—Give 10 drops tincture rhus tox. morning and evenings in a little honey smeared on the mouth. Bathe the swellings well with hot water, and then rub in a little of tincture rhus tox. 1oz. to methylated spirit 1 pint.

''W. H. D.,'' Tintinara, has a foal, four months, which is losing condition, and has slime hanging from mouth; does not care to suck.

Reply—Examine mouth well for grass seeds causing swelling of gums and throat; if these are not present the symptoms will probably be due to internal abscesses, in which case get some acetozone and dissolve as much as will lie on a shilling in a teacup of water and give a tablespoon to the foal three times a day till recovery sets in, then twice a day for a week longer. Acetozone is, like many other drugs, very expensive now; it is put up in small bottles, and obtainable from chemists.

''A. G. T.,'' Warcowie, has mare which was staked in hind foot middle January; stake pulled out two days after, free discharge, bathing, poulticing, embrocation; leg much swollen, painful, and discharging at hoof head.

Reply—The neighbor's advice to throw and open up the wound is very sound, and should have been carried out three months ago. As the mare is in foal an accident in that direction must be expected. The treatment in the main has been correct, but the applications of liniment were not advisable while the inflammatory condition was active. Having opened out the wound, and made sure there is nothing else to come away, take every precaution to avoid the navicular joint when doing so. Apply spirit of iodine twice a day for a week, poulticing with hot bran as well, then the spirit once a day till well, which latter condition is not likely to come about unless the operation can be performed by a qualified veterinary surgeon, as there are so many tissues that may be damaged by one who does not know the anatomy of the part thoroughly.

''A. C. B.,'' Bute, has mare which appeared to be in foal in last July, but did not deliver. The milk dried away, was served again last October, and now is passing stinking matter; has been doing so for three months, and has fallen away to nothing.

Reply—The foal was not passed in the first case and became mummyfied. Apparently a later conception took place, but this foal died and did not mummyfy, hence the discharge. You are quite right in supposing the mischief is in the breeding bag, but why did you not ask for advice earlier? I very much fear things have gone too far now for advice to be of much good. Surgical removal of the remains is necessary. After removal the womb will have to be syringed out with a warm solution of Condy, as much as will lie on a shilling to 2galls. of water, twice daily. Ten drops of tincture pulsatilla each evening, and a similar dose of tincture arsenicum each morning may do something to help.

'' E. F. D.,'' Lameroo, had a cow affected with red water after calving.

Reply—Satisfactory treatment for red water is ¾lb. Epsom salts, 1oz. liquor ferri perchlor., 1oz. ginger in a quart of warm red wine. Prevention may be carried out by giving the cow morning and evening for a fortnight before calving, 10 drops of tincture arsenicum. This may be mixed with a spoonful of honey, and smeared on the nose or tongue.

''G. W.,'' Sandalwood, has a stallion, aged, which ran in paddock with mares for two months, when worked fell away, and is very sluggish. Fed on half hay chaff, half cocky chaff, 3lbs. oats, and 2lbs. molasses.

Reply—An aged stallion would very likely overdo himself with young mares, but his present feed is very unsuitable. Two pounds molasses is far too much for a horse, and will induce chronic indigestion. No weight of chaff and cocky chaff is quoted, and the ration may be too much or too little, in either case indigestion would result. Cocky chaff is very unsuitable for a stallion. The oats might be raised to 9lbs. with advantage. It does not appear to be a case for drugs so much as diet. But if he does not improve in a month let me know.

"H. C. P.," Honiton, Y.P., has a cow which chews bones but will not eat bonemeal, fell off after calving, and in spite of routine treatment seems at a standstill.

Reply—She is evidently suffering from lack of vitamines, which can best be supplied by lucerne or similar green fodder. Failing this, let her have twice daily half a teacup of ship's limejuice diluted with a little water, also once a day a tablespoon of dried yeast in a pint of new milk warm. If after a week of this she picks up at all, give in addition to the milk and yeast a teaspoonful of tincture nux vomica.

"W. H. A.," Saddleworth, has new-born pigs, which shake and twitch: can hardly put hind legs to ground. Sow good and quiet; always fat and well: very cold day when born.

Reply—The trouble is chorea, or St. Vitus dance, and probably the piglets have anticipated treatment by dying, but if not three drops tincture nux vomica three times a day might help them. The disease is nervous, and when a sow is too fat the pigs suffer in development; the cold day was also partly responsible. If they survive they will be more profitable as roast sucking pig than kept to grow into pork, as they will always shake and twitch. The sow is not necessarily to blame, but if her next litter should be like these then her duty in life will be to die.

## HORTICULTURAL INQUIRIES.

[Reply supplied by the Horticultural Instructor, Mr. Geo. Quinn.]

"A. J. G.," Lyrup—(1) The residue from the acetylene generator consists principally of water-slaked lime. It should not be dug in fresh around the roots of trees or vines, but spread to dry into powder, when it may be scattered thinly over the surface of the soil, and harrowed or weathered into the soil by the action of rain. (2) Lime sulphur spray should prove useful in checking oidium mildew on grape vines, even if applied as late as the present, as it should destroy many spores. (3) The sulphate of iron and sulphuric acid wash is used upon grape vines in winter to destroy the resting forms of the anthracnose or black spot of the vine. It is swabbed on to the spurs and rods with a mop, and should not be allowed to freely touch the flesh or clothing of the operator, as its action is very caustic. The quantities used for a small area are approximately 28lbs. of iron sulphate, 1lb. sulphuric acid, and 5½galls. of hot water. The crystals of iron are put in a wooden or earthenware vessel, and the acid poured over them. Then the hot water is added whilst the mass is stirred with a wooden paddle. It is well not to make any more than will be used in a day's work.

## POISONING BIRDS AND MICE.

The following particulars relative to the use of strychnine for poisoning birds and mice have been supplied by the Director of Chemistry (Mr. W. A. Hargreaves, M.A.):—"The proper proportions to use for poisoning mice are 1bush. of wheat to 1oz. bottle of strychnine. If ordinary strychnine is used it will require to be dissolved in acetic acid and water in the following proportions:—12 fluid ozs. of strong acetic acid (not glacial) and 24 fluid ozs. of water. Soluble strychnine can be dissolved in water alone. The solution is poured on the wheat in an earthenware vessel and stirred well until the wheat has soaked it up. The wheat is then spread out to dry. Kerosine tins would do for the mixing if smaller quantities were used."

# BARRENNESS IN LIVESTOCK.

The Principal of the Roseworthy Agricultural College, Mr. W. J. Colebatch, B.Sc. (Agric.), M.R.C.V.S., delivered the following address at the Conference of South-Eastern Branches of the Agricultural Bureau:—

Of all the misfortunes that dog the footsteps of the stockmaster the loss of increase is by far the most serious. Apart from the heavy monetary losses that may be occasioned thereby, when the disaster affects large numbers, or when stud animals are concerned, there is the deep disappointment of the breeder who is earnestly endeavoring to improve his stock. In effect, he is deprived of the opportunity of exercising his skill as a breeder, and since, with the exception of pigs, farm stock reproduce but once in each year, the loss of time is a matter for grave concern.

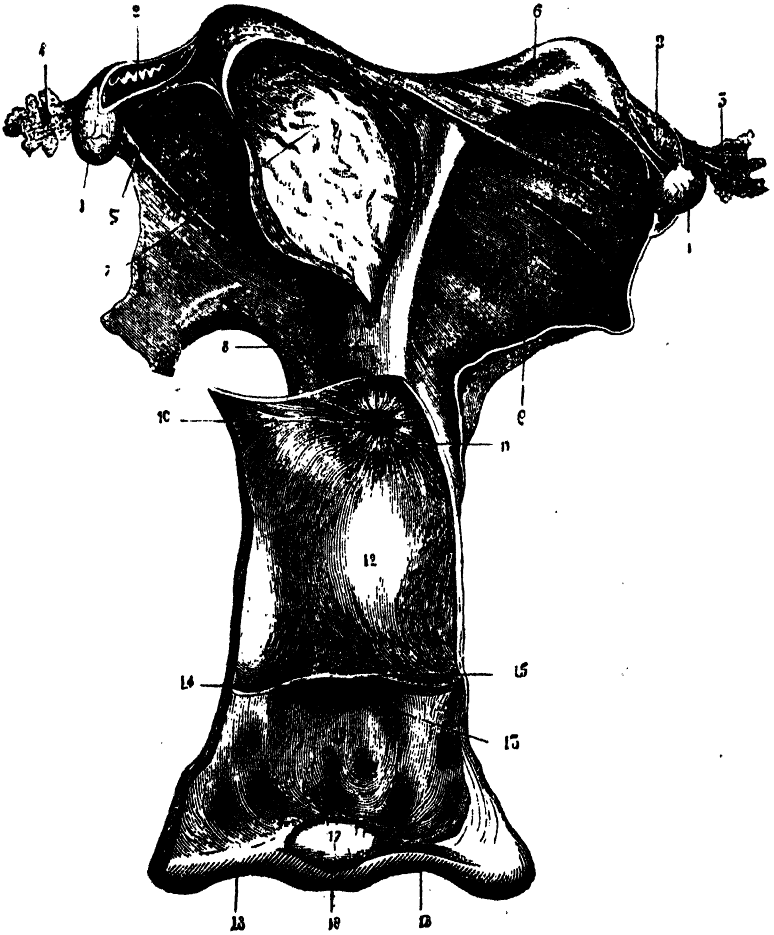
The extent to which infecundity exists amongst our flocks and herds is greater than is generally believed. In the "Thoroughbred Stud Book" it is shown that 26.64 per cent. of the mares are infertile or slink their foals. The Royal Commission on Horse Breeding concluded that 40 per cent. of the mares chosen for breeding fail to produce foals, whilst in the French studs 40.43 per cent. proved barren. With small stock, infertility is less frequently observed, but the average loss with cattle amounts to about 20 per cent. The above figures have reference to what may be regarded as normal conditions, and when circumstances are more than usually unfavorable the waste is very much greater. It behoves us, therefore, to examine closely the exciting and contributory causes, in order that we may protect ourselves as far as possible from undue losses and vexatious failures.

In the first place I would draw clear distinction between the unfruitfulness resulting from inability to procreate, and that due to incapacity to deliver and rear healthy offspring. Both conditions are equally disastrous to the breeder, but the latter is under his control to a greater extent than the former.

## INABILITY TO PROCREATE.

Inability to procreate may be due to a sterile condition of either sex, but generally speaking the fault lies with the female. It is sufficiently obvious that permanent infertility in the male would be quickly detected, and it is only in the case of temporary loss of power to propagate that doubts could arise. It is true that male animals, through long-continued sexual restraint, excessive stud work, plethora, debility, injury, or disease may be rendered uncertain sires, and where there are grounds for suspicion, the facts should be closely inquired into. As a rule, however, the male animal is cleared of responsibility by reference to the results of his mating with other females, and it then remains to discover whether the failure to conceive indicates a condition of sterility in the female, or merely physiological incompatability.

This can be only determined positively by successive matings with one or two other males, although it is well to have the generative tract examined beforehand, in order to avoid useless effort.



GENERATIVE ORGANS OF THE MARE; ISOLATED AND PARTLY OPENED.—(*Fleming*).

1, 1. Ovaries; 2, 2. Fallopian Tubes; 3. Pavilion of the Tube, External Face; 4. Ibid., Inner Face, Showing the Opening in the Middle; 5. Ligament of the Ovary; 6. Intact Horn of the Uterus; 7. A Horn Opened; 8. Body of the Uterus, Upper Face; 9. Broad Ligament; 10. Cervix, with its numerous folds; 11. Cul-de-sac of the Vagina; 12. Interior of the Vagina, with its Folds of Mucous Membrane; 13. Urinary Meatus and its Valve; 17. Clitoris; 18, 18. Labia of the Vulva; 19. Inferior Commissure of the Vulva.

Assuming that the reproductive organs are apparently normal, and that pairing with different mates has proved ineffective, it is a logical deduction that we have to deal with an animal incapable of breeding under existing conditions, and the only feasible plan is to modify these circumstances. The refractory animal should either be moved to another district, with dissimilar climatic and field conditions, or else the diet should be varied so as to add tone to her system and stimulate the sexual powers. These changes, however, may also yield negative results, and there is then strong presumptive evidence that we are confronted with a case of incurable sterility. This may be due to inability to produce living egg cells, a condition often associated with a weakened constitution, resulting from inbreeding, a blocking of the female tube that conducts the eggs from the ovary to the womb, or simply to an indisposition to breed. Animals that are bred for the first time after many years of their breeding period have elapsed are apt to lose the sexual instinct and procreative faculty, and we have other instances of permanent sterility in hermaphrodites, freemartins, and many hybrids.

With regard to mares, it may be remarked that some can only be depended upon to breed every other year, the intervening season being given up entirely to the care of the foal. We have also to recognise that some animals, although by no means infertile, are habitually "shy" breeders, and therefore frequently unprofitable.

Next let us consider the case of those females that have been found defective upon examination. There are a number of possible causes of barrenness that are discoverable by exploration. For example, the essential organs—ovaries—may be cystic or affected by tuberculosis, the generative system may be the seat of inflammatory processes, tumors, abscesses, or cysts; it may be obstructed by strictures, displacements, adhesions, a tough persistent hymen, or the accumulation of fat in the finer tubes. Further, the entrance of the womb, which as a rule is a tube of small calibre with very thick muscular walls, may be temporarily occluded by reason of nervous spasm, or permanently so through induration supervening on severe inflammatory conditions. Again, it may happen that the afterbirth, a mole, or even a foetus, has been retained within the womb, or that the surface of the genital passages is coated with a mucoid or muco-purulent secretion, which destroys the vitality of the "seed."

Many of these conditions may be detected without trouble, and in not a few of them slight surgical interference will furnish a complete remedy. There are others, however, such as tuberculosis of the ovaries, malignant growths, atrophy, or fatty degeneration of the ovaries or finer channels, and super-sensitiveness of the tract, due to brain or spinal cord disease, that defy all known methods of treatment.

Probably the commonest troubles that call for attention on the part of the stockbreeder are:—

1. Nervous irritability, leading to excessive secretion of mucus and ejection of the seminal fluid. To overcome this some rely upon a second service, following closely upon the first; others dash cold water over the animal immediately after mating, and force the animal to take exercise. In some cases good results have been obtained by mating

the animal when she is physically exhausted. It may happen, however, that the hyper-sensitive nervous system refuses to be quietened, and barrenness results from failure to hold the fertilising elements. The only satisfactory way of bringing such females into "use" is to resort to artificial means of effecting impregnation.

2. Acid mucus in vagina and womb. The reaction of this secretion may be tested with litmus paper, and if acid it may be corrected by injections of an alkaline solution prior to service.

3. Closure of entrance to womb. This condition is frequently met with in mares and cows, and when present it renders conception an utter impossibility. By manual dilatation just prior to mating an open passage can usually be obtained; but if not, resort must be had to the use of relaxing dressings, such as belladonna ointment.

4. Relaxation of the mouth of the womb. The womb in these cases is generally ballooned, and its mouth is widely expanded. Whilst this permits of the free entry of semen, it also allows it to escape, and barrenness not infrequently results. Cold astringent lotions should be syringed in before service, and, if necessary, the artificial system should also be adopted.

5. Condition and diet. Animals required as breeders should never be allowed to lay on fat to excess. The diet should not be lacking in flesh-forming elements, nor should it contain too large a proportion of fats, sugars, and starches. A plethoric condition is probably more inimical to breeders' interests than the opposite extreme, but both should be avoided as far as possible. An underfed, over-worked animal often produces imperfectly ripened eggs, and in any event she is quite unfitted to the task of developing and sustaining a foetus in addition to herself.

### INABILITY TO PRODUCE VIABLE OFFSPRING.

In stock work we frequently come across instances in which female animals, although quick to conceive, lack the power to carry their young for a full term, or to so nourish them during gestation that when born they are capable of entering upon a separate existence. When pregnancy is interrupted in this way, the effect upon the mother will be more or less serious, according to the stage at which the mishap occurs. If it takes place within a few weeks of conception, the accident may not even be noticed, and the first evidence that abortion has occurred will be the return of oestrum or heat. If, on the other hand, delivery should take place about mid-term, or at any subsequent time up to the 300th day for mares, 200th for cows, 140th for ewes, and 100th for sows, the consequences may be serious, especially if the young has been dead some time prior to birth. When delivery takes place shortly before the expiry of the normal period, and the foetus is sufficiently developed to maintain an independent existence, even for a brief period, we have what is termed premature birth. Amongst farm stock cows are most subject to slip their young before time, but the misfortune is by no means rare with mares and ewes. Sows, however, expel their young at the proper time almost without exception. In the non-contagious form of abortion, the young are generally cast in the early part of pregnancy; but when an outbreak of the contagious disease occurs, the expulsion of the foetus is more frequent in the later stages. On the farm it is usually the non-contagious type that is encountered, and with a view to understanding the best means of combating it we will first inquire into the nature of the complaint.

It is generally conceded that some animals are naturally predisposed towards abortion, and can only with difficulty be brought through to full term. If properly managed during the earlier pregnancy, this weakness will tend to disappear with age. Other generally accepted causes are:—

1. Rough, stormy weather or sudden and extreme changes in climate. The natural conditions under which most farm stock are kept in Australia inures them to inequalities of this character. It must be admitted, nevertheless, that inclement weather will often hasten the actual hour of birth amongst animals due to produce young. However, except in an occasional instance, when an animal prone to abort is affected, I doubt if it influences appreciably the number of abortions amongst farm animals. Still, for the sake of both mother and offspring, it is wise to allot fields that afford good shelter to stock heavy in young.

2. Faulty feeds and feeding. Bulky, innutritious fodders, by loading up the alimentary canal, cause indigestion, impaction, and timpany, and thus bring undue pressure to bear upon the gravid uterus or womb. This condition is fraught with great danger to both the mother and its offspring. The appearance of colicy pains leads to violent struggling, straining, and frequently heavy falls. In such circumstances there is always imminent danger of abortion.

Again, food of poor quality, such as musty chaff or grain, rusty or smut-infested hay, or mouldy silage are very liable to set up digestive disorders, which may react prejudicially on the womb and its contents. Ergot on rye or pasture grasses, which is credited with ecbolic action, is rarely met with in Australia.

3. Large drinks of cold water, particularly when the food canal is almost empty, as after a long journey, are a source of danger, and dirty foetid water or frosted herbage cannot be consumed without risk.

4. Violent and sudden exercise, heavy fatiguing work, especially if given intermittently, working between narrow shafts, backing heavy loads, and over-riding and over-driving, are all to be avoided with pregnant animals.

5. Severe frights, excitement, and fear are liable at any time to bring about a miscarriage, hence it is well to recognise that rough handling, cruelty, the use of a spur, and the reprehensible practice of dogging pregnant stock, may have serious consequences.

6. Diseases of a serious character, whether the womb and its contents be involved or not, are a potent cause of abortion, and it is often impossible to carry out proper treatment without increasing the risk already occasioned by the severity of the symptoms. Drastic purgatives, for instance, tend to stimulate the muscles of the womb, yet in certain ailments they cannot possibly be dispensed with.

7. In addition to the foregoing, there may be mentioned several other causes of minor importance, namely, railway travelling, sloping floors, slips and falls, insanitary surroundings, enemata, and manual examination of the rectum or generative passages.

### PREVENTION OF ABORTION.

We are now in a position to consider what steps should be taken to shield breeding stock from abortion and its results. Obviously the dangers already referred to must be avoided altogether or reduced to a minimum. Where a natural predisposition to abort is known to exist, the interval between successive impregnations should be extended, so as to allow at least a year's rest. Sometimes a few precursory signs, such as restlessness, switching of the tail, turning to the flank, abnormal foetal movement, and possibly some straining, may be observed, and prompt action should be taken to suppress them. First and foremost, the animal should be isolated in a darkened stall and kept as quiet and comfortable as possible. The food should be concentrated and easily digested, the water should be pure, and in cold weather the body should be amply covered. If labor pains are apparent, have the belly gently hand-rubbed. Impending abortion may be checked in this way, particularly if sedatives are administered at the same time. When the pains are severe, and cannot be allayed in this way, there is very little hope of saving the life of the foetus. Although the contagious form of abortion affects larger numbers of stock at any one time, and is therefore more to be dreaded, I do not propose to discuss it on this occasion, as I hold the opinion that it should only be dealt with under the guidance of a qualified veterinary surgeon. It is sufficient for the present purpose to instance it as one of the most important sources of unfruitfulness in cows and mares, and to state that the institution of proper measures will enable us to control its effects.

### MANAGEMENT OF PREGNANT ANIMALS.

In the management of pregnant animals, apart altogether from the danger of abortion, we have to consider the general preparation of the mother and young for the act of delivery and their subsequent welfare. There are no special laws to propound, but the rules that apply generally to all stock must be more rigidly observed with pregnant animals. The precautionary measures already cited in connection with abortion apply generally throughout pregnancy. In addition, I would point out that the greatest losses invariably occur where stock are pampered. All pregnant animals are improved in general health by exercise. Working stock should be kept at their customary duties until within three or four weeks of full term, and in my experience they are all the better if given light duties to within a few days of parturition. To some extent this depends upon the temperament, animals of a placid and lymphatic type being safe to work later than those of a more excitable nature; but there are a few cases in which slow work will not prove beneficial towards the end of pregnancy. Even pregnant sows are all the better for a run at pasture throughout gestation. The tendency towards obesity should be guarded against, especially in the early stages of pregnancy, when there is a tendency for the mother to lay on condition at the expense of the foal. The diet should be made richer and less bulky as development proceeds, and the bowels should be maintained in a healthy condition. Milking cows are commonly milked right up to calving if they are yielding well, but having regard to the interest of the calf, it would be better practice to dry them off during the seventh month, and regulate the feed according to the condition, in order to guard against milk fever. As the date of parturition approaches, pregnant animals should be turned into a field, when they can be kept under close surveillance in case of accidents. Flocks of lambing ewes and sows about to farrow should be disturbed as little as possible.

### MANAGEMENT AT THE TIME OF PARTURITION.

A little assistance is often required at parturition with all kinds of domesticated animals, and if given in good time, a difficult and perhaps fatal complication may be obviated. It is most important to attend to the young as soon as delivery has taken place; not infrequently they are born in an exhausted condition, and require to be promptly stimulated, in order to enable them to hold on to life. First see that the nostrils are not covered with membrane or blocked with mucus; next set about strengthening the respirations by moving the tongue in and out, blowing violently into the nostrils and mouth, working the limbs, and applying brisk friction to the body surface. Weak respirations may be strengthened by administering a little brandy and water. The cord must be examined to see if it is broken or is still intact. If broken off about the right distance from the belly, and if hemorrhage is negligible, it is sufficient to wash the stump. If, however, it is unbroken, or if the stump is bleeding profusely, it must be ligatured. Before severing the unbroken cord, it is important to notice whether the afterbirth is still adhering to the mother or not; if it is, the cord must be ligatured in two places and severed in between, otherwise the dam may suffer the loss of blood which she can ill afford to spare. At the moment of parturition, a little gentle traction is usually all the assistance that the mother requires. When difficulties arise, the bowels and bladder should be emptied, the passage well oiled, and such help in correcting abnormal presentations and positions as the stockman's experience and skill will enable him to offer, should be given, with due regard to the importance of cleanliness throughout the operation.

### MANAGEMENT OF ANIMALS AFTER PARTURITION.

Immediately after birth has taken place, the dam should be allowed to rest, except in cases of extreme exhaustion, when a stimulant should be at once administered. One of the first cravings of the mother will be for a drink of water, and when this has been satisfied, she will usually attend to her offspring. The mother's chief needs at this time are an ample supply of milk-producing food and plenty of fresh water. The cleanings need not be interfered with for a while, but if they are not shed naturally within 12 hours of birth in the case of mares, and 24 hours for cows, they must be carefully separated and removed. If the milk flow be deficient, diet should be a mixed one, consisting of green grass or lucerne, with chaff, crushed oats and bran fed damp. An occasional mash of bran or boiled barley is also helpful.

Mares should be given three or four weeks complete rest after foaling, and if, when put to work, the foal is not allowed to accompany its mother, it should not be permitted to suckle her till she has cooled down and had some of the heated milk in the udder withdrawn. Foals should be allowed to suckle at least three times a day during working hours; if long periods elapse between meals, digestive disorders ensue as the result of engorgement. The function of the first milk or colostrum is the same in all classes of stock—it acts as a laxative, serving to clear the passage of the accumulated and often inspissated secretions which block up the lower bowel. To assist this action it is a common practice in some stables to give all foals a dose of oil within a few hours of birth.

This brings me to the conclusion of my remarks upon unfruitfulness in livestock. I have indicated some of the chief reasons why our flocks and herds do not multiply more rapidly, and I also have endeavored to point out to what extent and in what manner those in charge of breeding stock may exert themselves to maintain this loss through breeding troubles at the lowest possible minimum. In so doing, I have attempted to place before you certain facts that should prove at once interesting and beneficial to all who are interested in the breeding of livestock.

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## WHITE ANTS.

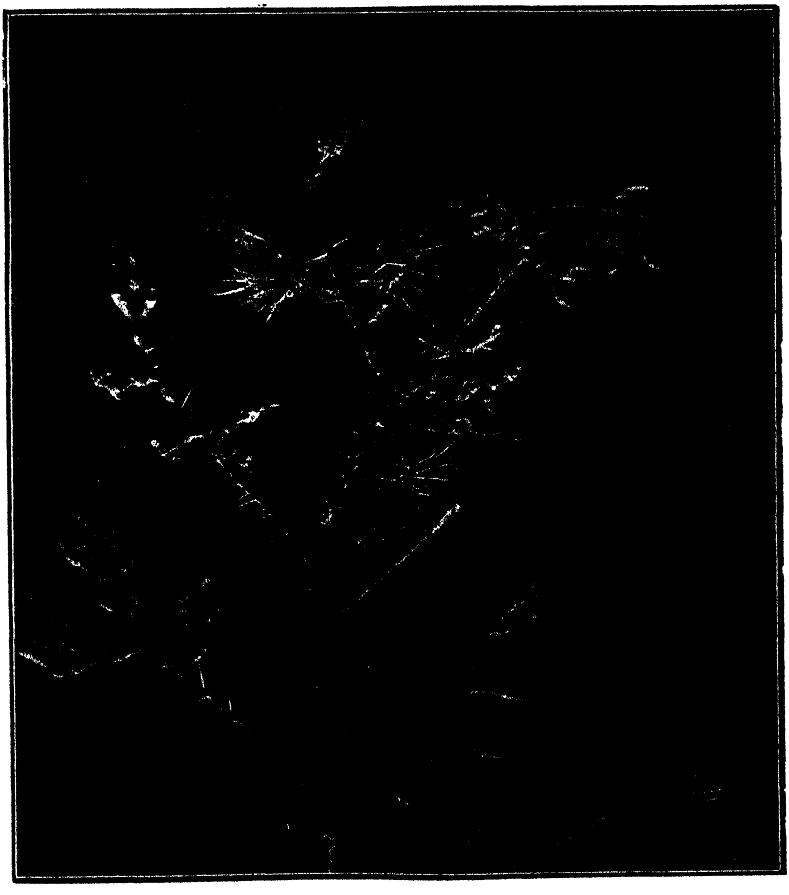
To prevent ants from working their way into a wooden building it is essential that the building should be erected upon jarrah or red gum stumps, the ends let into the ground being first well charred with fire, and tarred in addition if possible (says Mr. J. Paull, Field Engineer). The top of the stumps should be sawn off horizontally at floor plate level, and a strip of flat galvanized iron (projecting 3in. or 4in. beyond faces of stump all round) be secured to them. Should the white ants work their way up the stump, the galvanized iron will stop them. The floor plates should then be secured to the stumps on top of the galvanized iron. As an additional precaution the floor joists are often payed over, especially the ends, with a white ant exterminator, also the under side, and joints of flooring boards, bottom lengths of studs, &c.

The main thing to look out for is that plenty of light and air can circulate under the building. On no account whatever should any earth be in contact with the timber.

# SOLANUM ROSTRATUM.—A NEW WEED PLANT.

[By Professor T. G. B. OSBORN, M.Sc.]

*Solanum rostratum* (Dun.), a plant from the south and west of the United States of America, has recently been sent into the Department of Agriculture as a weed by the District Council of Ninnes. As this is apparently the first record of the plant in South Australia, a short description may be useful to assist farmers and others interested in limiting the spread of undesirable weeds to recognise it.



The plant is an annual and grows erect, with stems as much as 2ft. high, branching freely. It is thickly covered with yellowish star-shaped hairs, and also numerous yellow, spine-like prickles. These latter are often nearly half an inch long, and make the plant very objectionable to handle, either green or dried. The leaves are oval in shape, irregularly lobed with two or three deep indentations on each side. They, too, are prickly along the main veins.

The flowering clusters are freely produced at the side of the stem, the flower stalks being exceedingly prickly. The calyx also is densely covered with prickles; it remains after the petals have fallen, and almost completely encloses the berry. The fruit thus is an intensely prickly burr, an inch or so in diameter, including the spines. It is thus unlike the tomato-like berry of the Sodom apple and other solanums.

The petals are five in number, and form a yellow star. One of the stamens is much longer than the remaining four, and curves upwards at the front (anterior side) of the flower. From this feature the specific name *rostratum* (beaked) is derived.

*Solanum rostratum* has received a number of popular names, the most general in its native United States being buffalo burr, a name given it by the pioneers from its prevalence around old buffalo wallows in the prairie States. Other names are pincushion or spiny nightshade, sand burr, Texas or Mexican thistle. The names are all more or less descriptive of the main characteristic of the plant—its spininess.

Though new to South Australia, the buffalo burr was first recorded in Australia by Mr. Maiden, in New South Wales, in 1904. In 1910 Professor Ewart recorded it for Victoria under the name of *Solanum heterandrum* (Pursh).

Since the plant is an annual, and seeds freely, there is every reason to expect its rapid spread in the State unless care be taken to destroy it before it becomes established. It is said to behave as a "tumble weed" in the United States, the stem breaking off from the root and being blown along before the wind. In its progress the seeds are shed, in a manner familiar to those who know the "roly-poly" (*Salsola kali*) of the north and saline areas in this State. Buffalo burr might become a serious nuisance, especially upon waste places in districts where the soil is light and sandy. Like all solanums, it is more or less poisonous, but its spininess will prevent stock or children from eating it.

Plants of buffalo burr should be pulled up before they fruit. A year's seeding in this, as is many other cases, is likely to mean many years' weeding.

# BREEDING HORSES.

## CARE AND ATTENTION NEEDED.

The Government Veterinary Lecturer (Mr. F. E. Place, B.Sc., M.R.C.V.S.) recently delivered an address before the members of the Coonalpyn Branch of the Agricultural Bureau on the subject of the care and attention of breeding horses. Mr. Place said:—

The first and chief necessity is a breeder's eye—that is, a native knowledge of the habits of the animals in one's care. They each have their individual peculiarities, which must be the object of study by the breeder, and it is not given to every man to become a breeder in a successful way, simply because he does not live in sufficiently close touch with his stock; and this is especially the case in South Australia, where the team is regarded too much in the light of being a tractive force rather than attractive creatures.

One can lay down no hard and fast lines or code of rules to be followed in breeding, because success in that line is a matter of individuality and fitness in its broadest sense. One man will fail with the best of animals at command, and another will command success from the most unpromising material by careful observation of individual characteristics and by culling ruthlessly.

If the sheep industry of South Australia had been carried on after the lines of horse breeding in this State, it would not be where it is now; a very moderate ram worked to death on inferior ewes would not build up studs of world-wide renown; and yet a low-priced stallion is supposed to be able to serve an unlimited number of mares of all sorts of nondescript types, and leave a good number of well-shaped foals. It is not in the nature of things that this should be.

The constant acquisition of new facts forcibly brought before one by the failures of the past is perhaps the most salient point in a breeder's passage from inferiority to success, and if a man cannot profit by the lessons dearly learnt he will never make a successful breeder. What those lessons will be will appear with startling distinctness, especially in a district in which the industry is comparatively young; but at the same time mistakes can be, perhaps, more cheaply remedied in a young country than in an old-established district where the amount of capital invested in breeding controls to a great extent the fashions to be followed.

### FAILURES.

Failures are often attributed to the force of heredity, and it may be so, especially when the fault lies with the human factor, who is ever ready to blame anyone but himself. It sounds well to bow the head beneath the martyr's crown, and blame the force of heredity for faults in one's own methods. It should be borne in mind that the successful lines were founded and fixed by men who troubled their heads little about this ism or that ology, but who had a keen eye for beauty, and knew the form they wanted when they saw it; so they eliminated weaknesses of constitution and special defects by mating the types they desired, regardless whether they conformed to the mathematics of one ism or the geometry of another. Far be it from me to decry the value of scientific observation, that infinite capacity for taking pains which leaves the world the richer by many facts of value; but it does appear to me that in South Australia there is too much of the Greek philosophic spirit, the desire to worship the unknown, and too little of Roman sturdiness, the will to better conditions as we find them. In horse breeding, in particular, the blunt adoption and improvement of things as they are will be more profitable than the seeking after ideal perfection that is unattainable. To hitch one's wagon to the stars often involves a nasty fall when the rope snaps, and he who follows the furrow avoids that, even if his gear is faulty.

The advantages of free crossing or the failures of in-breeding may well form the subjects of academic discussion, but the fact remains that in a district such as Coonalpyn, if one wants to breed, one has to take the stallion offering, and mate him with the mare as she is. But that is no reason why the stallion should not be the best obtainable, and that as the mares come on they should not be each generation better than the last. Individual keenness will do much, but co-operation will do more. Some six years ago Professor Lowrie laid before Congress his scheme for breeding clubs or societies, and with but one or two exceptions his sound business proposition fell on deaf ears. In years to come another Pharoah will arise who knew not Joseph, and people will say "How wise; why was this thing not done before?"

Districts like Coonalpyn are essentially those in which the provision of a good sire by co-operative effort would quickly respond by the betterment of the stock.

A horse that is shapely and sound, full of pluck and good temper, is not picked up cheaply at any time, and a club could better afford to obtain such an one than an individual. I know that "so many men, so many opinions," holds good; but if so many men are out to get a good horse, the differences in their opinions are an advantage rather than otherwise, for they will represent the general average.

### THE CARE OF THE HORSES.

Having got your horse, keep him well. Nothing has shocked me more than the disgraceful conditions under which really good stallions are kept in South Australia during the off season, in close, dark, dirty stables, deprived of exercise, light, and air. They lay on fat, so that they come out in the spring like grubs that have lived underground. Then they must have physic to brighten their coats, sweating rugs and lots of grooming in order that they may shine and take the eye with their fat.

Let the horse live a natural life, with the collar on his neck, free to breathe fresh air and revel in the sunshine. No matter if his coat be long, so that it lies down and glistens; he will soon shed it when the spring comes, and then under his short coat the outlines of his muscles will stand out as if carved in marble, springy as steel. He will not girth as much round his belly as the blubber carrier, but round his heart, whence comes his pride, he will girth more. The stallion as a worker shows what his stock will be, and his temperament depends to a great extent on his upbringing. He learns bad manners from his groom; if he is handled firmly and kindly as he grows up he is a horse, not a man-eating beast.

### THE MARE.

The mare is as we find her, but if she is a fair average type she will drop foals that will be a credit to her if the sire is better than she is. While she is in foal she should live a natural life, working fairly right up to the time she foals. Should she in stony or stumpy country? Yes, certainly, if commonsense is used in loading her. She should not be squeezed in the middle of the team, but, where possible, have the off side place, and be the one horse too many in the team; it is far better that than the team should be under horsed, and she straining to do more than her share. If she is young, remember that she has to develop herself as well as provide for the growing foal, so that her feed should be generous and her work divided into comparatively short periods. Over-long working, as at seed time, is the worst thing that can happen to a mare. The weariness induced has a very bad effect both upon her and the coming foal; while, on the other hand, they both benefit by fair and regular work. Generous feeding does not mean one bag of cocky chaff and two bags of sand, but good chaff and bran, and when oats are cheap a few pounds of crushed oats gradually added as she grows heavy.

As foaling approaches, salts and so forth may be needed occasionally, but bran, clean hay, natural grasses, or moderate amounts of lucerne or berseem will be much more valuable.

### FOALING.

Where should the foal be born? In the open whenever possible. Look at the mare in her free state; she wanders off to some secluded lair, where water and feed can be had easily, and nurses her foal and herself away in the quiet. Out in the open she can put forth those very strong muscular forces which parturition implies, which she is often afraid to do when cooped up in a not too roomy box shared by mouse-eaten bags, super., drill boxes, and an odd roll or two of barbed wire, because her owner is anxious for her welfare; just as if the stars of heaven and the grass dew laved are not clean enough cover and bed for both dam and foal. Many a mare goes wrong in the foaling because she is shy, and frets at the constant worry of a man with a lantern. He never used to come prowling round before, and now, when instinct tells her to get quietly away by herself, every few hours he is poking around. If she must foal indoors, have a peephole through which you can see her without disturbing her.

Foaling is a very quick physiological act, and should require no assistance; those cases that do are outside the scope of this lecture, as they are entitled to detailed consideration. Interference with the navel is only desirable when, owing to extreme toughness, it does not break, when it may be taken round the fingers of each hand and torn apart. It is better to do this than to cut it, as bleeding is avoided. When navel ill is about a district, it is well to dip the end in tincture of iodine, but tying is never desirable, as a dirty bit of tape or string will hold more germs than it will keep off.

Cleaning should take place in a few hours, and if the afterbirth has not then come away, take a split stick and wrap the darker inner part of the cleaning round it, rolling with a steady strain, until the outer, lighter, thicker part disappears inside. In a few moments all will come away cleanly, without internal interference, which is never desirable, although sometimes necessary when the cleaning has remained too long and become putrid.

Should the foal not suck, see that its bowels are open. Removal of the foal dung or meconium by the finger dipped in glycerine will bring this about, or in obstinate cases a small enema of warm soapy water.

Dislike to let the foal suck will involve many ingenious plans, but in the case of a nervous young mare a good sedative dose, such as 2oz. of laudanum, will bring about a drowsiness of which the foal will soon take advantage. Fomenting the udder with warm water and applying glycerine is sometimes necessary.

### WORKING THE NURSING MARE.

Work is the making of the in-foal mare, but the undoing of the nursing mare and foal as well. If she is indispensable, then it is better to wean the foal early, for nature soon dries up the milk when at work, and hunger will drive the foal to eat. But if one is breeding for the sake of getting good horses, work must be so arranged that the nursing mare has nothing to do but look after her foal.

The foal heat comes on about the ninth or eleventh day, and lasts three days; after that she comes in heat every three weeks, and remains on heat for a week. It is better to put her to horse at the foal heat, when the great majority of mares that breed every year will conceive; but after that they are very uncertain while suckling their foal, often taking the horse freely, but not holding him, and thus throwing one's calculations out as to the time of foaling, which may be taken as 48 weeks from the time of conception.

### MATING.

The psychology of horse breeding receives but scant attention. It is known that a stallion will nick better with certain mares than with others; but the fact that the sire and dam have any choice in mating is generally ignored, though in the free state the way the stallion selects and protects his mares, and has his favorites even among them, is very marked, and mares, too, have a preference of mate which the average farm breeder takes no notice of. So that it is a poor policy, from a breeder's point of view, to force a stallion to serve an unwilling mare; the resulting foal, if there is one, will not be vigorous and lusty.

When the mare is in the middle of her heat one mating will ensure conception, and it is a needless waste of energy to give more. A little care and calculation in this respect will enable a stallion to leave a bigger percentage of foals, and those better ones than is the case where he is overworked on a less number of mares.

Granting that the mare is well in season, the stallion should be led up to her sideways, so that if she lets out he escapes the blow, and if this precaution is taken, sidelines and so forth can be dispensed with.

Wearing journeys, unhealthy stables, too many mares at one place, too few at another, and he often gains a reputation for being an uncertain foalgetter, simply because he is too busy early in the day and tired at the latter part.

On the other hand, if he is not overworked early, he is more likely to stop his mares when they come to him at the end of a day's work than when they are served early in the day and go straight to work.

Allowing for the best procurable, both sire and dams, the character of the land and climate have much to do with the fixing of type; and no greater mistake can be made than violent outcrossing with a view to suddenly improving a type, and the suitability of surroundings must always be considered when choosing a foundation type.

### A Type for the District.

In a district such as Coonalpyn, where there is a tendency to grow weedy, because of the newness of the pasturage, it will be better for some years to come to breed on lines that lean to lowness and compactness, rather than look to an immediate raising of the standard. Therefore, with the class of mare available, I would suggest a stallion reared in a colder and wetter district, such as the lower South-East, rather than from the north, and because the mating of widely different types is never a success, he should be a compact horse of massive character. Because "like produces like," his pedigree should be reliable, in order that he may make his mark and leave his stamp upon his stock, such prepotency laying the foundation for future improvement, which should be more on the side of uniformity than of certain markedly better foals. A gradual raising of the standard will be far more profitable, both from the point of view of work or sale, than will be the possession of one or two fine specimens.

Then, too, there is somewhat of the formation of a new type to be considered, what in England at the present moment they are talking of as the "light heavy horse," and to fix such a type inbreeding must play its part. Type can be safely bred to with near relations when they are sound, but it is fatal to do so when they are not; a word to the wise is sufficient. Type can only be ensured from sound stock.

It is generally thought that the sire influences the shape, and the dam the temper and constitution. I do not think much value can be placed on this; but certainly when the sire is really masculine, as he always should be, he will leave his mark, and when the mare is a good brood mare she will transmit a feminine character to her fillies.

One reason why the thoroughbred has advanced more than the draught breeds is that the course is a more practical test than the ring. In the former to be the dam of a winner is to have an enhanced value, while in the ring a good mare may be quite a poor female, and yet have a long winning career. On the course the masculine female will win, but not be the dam of winners.

In endeavoring to fix a new type suitable for a district, it is often advisable to put a colt on the mares of that district, as he leaves a more vigorous impress of his style than does an old horse.

### SHELTER.

Shelter is a point that in a wind-swept country must not be neglected, and it is curious to notice on a cold, windy, and wet night horses will get to leeward of a shed, but not go in. They seem to have an instinctive preference for sleeping out; so that in a district such as the one under consideration, a hay or straw stack is much to be preferred. They can choose which side they like, they can tear out bedding if they wish, and can take a bite whenever they feel inclined.

Food comes last, but by no means least, for consideration. Coonalpyn with its limestone produces fodder very deficient in lime salts, especially the phosphates—salts absolutely necessary for the production of bone and size—and unless they are available breeding will never be a success. There is no reason why it should not be. They cannot be regularly supplied in artificial form, such as licks and so forth; but calcium is especially abundant in leguminous hays, in which phosphorus is also found freely when the seeds are in the hay, and in the growth of clovers, vetches, and so forth lies the keynote.

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# EXPERIMENTAL FARM HARVEST REPORTS.

[By W. J. SPAFFORD, Superintendent Experimental Work.]

## 2.—VEITCH'S WELL EXPERIMENTAL FARM.

(Manager—Mr. L. SMITH.)

This farm is situated in the hundred of Allen, 158 miles from Adelaide, on the Loxton Railway. It contains 3,800 acres of land, the bulk of which is sandy, the remainder running to shallow light loam soils overlying hard limestone rock—conditions similar to thousands of acres of surrounding country.

### THE SEASON 1916.

The year opened with but little rain for the cleaning of the fallows; January, February, and March together only produced 31 points, whilst the average for this period is 2.59 inches. At this particular farm this dry period was not a very great disadvantage, as the soils have not been cropped often enough yet to be very dirty with weeds. April also had very little rain, only 20 points being registered. During the next month (May) when good germinating rains are expected and are the rule, only 43 points fell as against an average of 1¼ inches, but the weather was such, and the falls so split up, that the seed germinated well despite the lack of total rain. From June onwards, right throughout the year no further trouble regarding rains was experienced, and every month showed rain in excess of the farm average for the same period. These rains were so good that a record yield, very much in excess of all previous crops secured, was harvested notwithstanding the fact that very poor seeding rains fell. The table following sets out in detail the rainfall registered at this farm since 1909:—

*Rainfall Distribution at Veitch's Well, 1909-1916.*

| | 1909. | 1910. | 1911. | 1912. | 1913. | 1914. | 1915. | 1916. | Means, 1909-1916. |
|---|---|---|---|---|---|---|---|---|---|
| | In. | In. | In. | In. | In. | In. | In. | In. | In. |
| January | 0·56 | 0·26 | 0·84 | — | 0·10 | 0·31 | 0·48 | 0·18 | 0·34 |
| February | 0·19 | 0·32 | 3·17 | 0·29 | 2·67 | 0·56 | — | 0·03 | 0·90 |
| March | 0·66 | 4·78 | 0·65 | 0·30 | 3·22 | 1·06 | — | 0·10 | 1·35 |
| April | 0·15 | — | 0·03 | 0·18 | 0·14 | 1·01 | 0·51 | 0·20 | 0·28 |
| May | 3·03 | 2·16 | 1·32 | — | 1·23 | 0·52 | 1·33 | 0·43 | 1·25 |
| June | 2·48 | 2·09 | 0·90 | 3·95 | — | 0·35 | 1·91 | 1·97 | 1·71 |
| July | 1·73 | 1·41 | 1·11 | 1·09 | 0·53 | 0·38 | 0·63 | 2·43 | 1·16 |
| August | 2·24 | 0·58 | 0·66 | 1·25 | 0·67 | — | 1·67 | 4·01 | 1·38 |
| September | 1·78 | 2·34 | 2·13 | 1·33 | 3·22 | 0·15 | 1·99 | 2·57 | 1·94 |
| October | 0·56 | 0·88 | 0·36 | 0·34 | 1·80 | 0·15 | 0·56 | 1·64 | 0·79 |
| November | 1·07 | 0·69 | 0·77 | 2·05 | 0·68 | 1·10 | 0·19 | 2·04 | 1·07 |
| December | — | 0·68 | 1·42 | 0·79 | 0·69 | 0·65 | 0·56 | 1·09 | 0·73 |
| Total | 14·45 | 16·19 | 13·36 | 11·57 | 14·95 | 6·24 | 9·83 | 16·69 | 12·91 |
| Total "Useful" Rain (April to November) | 13·04 | 10·15 | 7·28 | 10·19 | 8·27 | 3·66 | 8·79 | 15·29 | 9·58 |

### "USEFUL" RAINFALL AND ITS DISTRIBUTION.

It is a fact of common knowledge that it is not the total rain that falls during a year so much as the distribution of that rain which determines what the cereal crops shall be. To be able to see clearly what the distribution of the rain was it is necessary to divide the time that the crops are growing into periods which we know by experience play a very important part in the crop growth. The table below sets out clearly what was the distribution of the "useful" rainfall for the past season:—

*Distribution of "Useful Rainfall in 1916 comparatively with the Means from 1909-1916.*

| | 1916. | Means from 1909 to 1916. |
|---|---|---|
| | In. | In. |
| Seeding rains (April-May) | 0·63 | 1·53 |
| Winter rains (June-July) | 4·40 | 2·87 |
| Spring rains (August-October) | 8·22 | 4·11 |
| Early Summer rains (November) | 2·04 | 1·07 |

As a rule, in our wheat-growing areas, particularly in low-rainfall districts, the distribution of rain that we look for to grow crops is something as follows:—(1) Fair seeding rains to germinate the seed and give the young plants a good start; (2) quite twice the seeding rains during the winter (June-July); (3) fair rains again throughout the spring months (August-October); and (4) a couple of rains during the early part of November. In the later and better districts the late spring and early summer rains need to be more plentiful, and extended later into the year. These period rains all play an important part in what the crop will be, and in the average year the "seeding" rains, providing the others come in some sort of regularity, without big gaps between the falls, appear to have the greatest influence on the crops. When the seeding rains are lacking it usually takes good winter and good spring rains and an extended season to make up for the deficiency. This is what happened this year, as a glance at the above table will show. Seeding rains were poor, winter rains good. Spring rains remarkably good, and early summer falls also heavy. This distribution of the rains and the total "useful" rain counteracted the lowness of the "seeding" falls, and the farm ended the season with its record yields. The comparatively large amount of rain recorded in early summer, accompanied as it was by exceptionally cool weather, had the inevitable result of producing very rank crops and delayed their ripening, with the result, even in a district like this with its low average fall, of badly lodging all varieties having a tendency this way.

## CROPS.

Again this year the only crops grown were the cereals wheat, oats, barley and rye, and in all cases, except the small area of rye, which was sown on autumn ploughing, were grown on fallowed land.

*Hay Crops.*—The crops for hay were sown in Field No. 5, which was ploughed from August 20th to September 21st, 1916, and worked throughout the year as bare fallow. During the period April 15th to 25th about 112 acres were drilled in, composed of approximately 37 acres Algerian oats, 40 acres Baroota Wonder wheat, and 35 acres King's Early wheat. Each block was drilled in with 60lbs. seed and 1cwt. superphosphate to the acre. In Field No. 6 about nine acres of Silver Baart wheat which was rather rank was cut for hay, and together with a little more than five acres of headlands, brought up the area cut to 127.08 acres. As was pointed out under the heading of "rain distribution" the season favored strong growth, and this was shown by the hay return, which totalled 243 tons (stack measurement) from the 127.08 acres, or an average yield of 1 ton 18cwts. 27lbs. per acre. That this is remarkably good for the district is easily realised if it be compared with the average hay return for the farm from 1910 to 1915, which was only 12cwts. 37lbs.

*Hay Returns—Veitch's Well, 1910-1916.*

| | Rainfall. | Area. | Total Yield. | | | Yield per Acre. | | |
|---|---|---|---|---|---|---|---|---|
| | In. | Acres. | T. | C. | L. | T. | C. | L. |
| 1910 | 16·19 | 82·00 | 82 | 0 | 0 | 1 | 0 | 0 |
| 1911 | 13·36 | 121·50 | 74 | 18 | 0 | 0 | 12 | 37 |
| 1912 | 11·57 | 218·00 | 109 | 0 | 0 | 0 | 10 | 0 |
| 1913 | 14·95 | 140·00 | 70 | 0 | 0 | 0 | 10 | 0 |
| 1914 | 6·24 | 100·00 | — | | | Total failure | | |
| 1915 | 9·83 | 158·00 | 180 | 0 | 0 | 1 | 2 | 88 |
| 1916 | 16·69 | 129·51 | 243 | 0 | 0 | 1 | 18 | 27 |
| Means | 12·91 | — | — | | | 0 | 16 | 22 |

*Oat Crops.*—For the first time oats were grown as a crop for grain. Part of Field No. 5, consisting of about 13 acres, was drilled in with 1½bush. of seed and 1cwt. superphosphate to the acre with Algerian oats. This crop made very good growth, and really would have been a better hay than a grain crop, but the yield of 478bush. 37lbs. from an area of 12.39 acres, or an average yield of 38bush. 26lbs. to the acre, is highly satisfactory.

*Barley Crops.*—One of the 6-rowed types of barley was grown again this year, but under much better conditions than was the case the previous year. Between May 4th and 7th about 20 acres of Field No. 5 were drilled in with barley at the rate of 50lbs. seed per acre with 1cwt. superphosphate and made good growth throughout the season. The yield of 517bush. 20lbs. from 20.10 acres, or 25bush. 37lbs. per acre, is no criterion of what the crop was. It was so rank in places that it lodged very badly, with the result that only a portion of the grain was secured.

*Barley Returns—Veitch's Well, 1915-1916.*

| Year. | Rainfall. | Area. | Total Yield. | | Yield per Acre. | |
|---|---|---|---|---|---|---|
| | In. | Acres. | Bush. | lbs. | Bush. | lbs. |
| 1915 | 9·83 | 22·72 | 248 | 91 | 10 | 46 |
| 1916 | 16·69 | 20·10 | 517 | 20 | 25 | 37 |
| Means | 13.26 | — | — | | 18 | 16 |

*Rye Crops.*—Only a very small plot of rye was sown. This was harvested for grain, and from an area of 0.36 acres, 3bush. 12lbs. was collected for an average of 8bush. 53lbs. per acre.

*Wheat Crops.*—Quite a number of varieties of wheats were sown this year, the seed of most of them being graded pure type seed from Roseworthy. As most of these varieties only occupied comparatively small blocks, it will not be until the 1917 harvest that pure type seed will be available for distribution from this farm.

Field No. 5.—As was pointed out when dealing with the hay, this field was not ploughed until the period August 20th to September 21st, and from then on till seeding operations, was worked as circumstances demanded. Besides carrying hay, oats, and barley a number of varieties were drilled into this field, all at the rate of 60lbs. seed and 1cwt. superphosphate to the acre, and they behaved as follows:—

*Wheat Varieties in Field No. 5, 1916.*

| Variety. | Area. Acres. | Total Yield. Bush. | lbs. | Yield per Acre. Bush. | lbs. |
|---|---|---|---|---|---|
| Federation | 2·57 | 66 | 16 | 25 | 47 |
| Queen Fan | 2·57 | 58 | 57 | 22 | 56 |
| Baroota Wonder | 2·50 | 53 | 48 | 21 | 31 |
| College Eclipse | 2·62 | 53 | 12 | 20 | 18 |
| Yandilla King | 12·34 | 249 | 40 | 20 | 12 |
| Walker's Wonder | 2·52 | 47 | 6 | 18 | 41 |
| Silver Baart | 2·57 | 47 | 16 | 18 | 24 |
| Cumberland | 2·57 | 47 | 15 | 18 | 23 |
| Late Gluyas | 2·59 | 46 | 20 | 17 | 53 |
| Gluyas | 2·59 | 43 | 47 | 16 | 54 |
| King's Red | 2·57 | 41 | 30 | 16 | 9 |
| Bearded Gluyas | 32·74 | 456 | 29 | 13 | 57 |
| Red Russian | 1·33 | 17 | 33 | 13 | 12 |
| Baroota Wonder | 2·60 | 12 | 4 | 4 | 38 |

Field No. 6.—This field was ploughed between July 23rd and August 19th, and from then on till seeding time was kept free from weeds and from surface crusts. From April 26th to May 13th wheat was drilled into this field at the rate of 60lbs. with 1cwt. superphosphate to the acre, and the following varieties were used:—From April 26th to May 4th about 113 acres of Silver Baart; from April 29th to May 4th about 46 acres of Cumberland; from April 21st to May 6th about 37 acres of Federation; from May 5th to 9th about 59 acres of Yandilla King, and from May 8th to 13th about 87 acres of Baroota Wonder. In this same field experimental plots with Silver Baart wheat—details of which are shown later—were drilled in between May 1st and 3rd.

The results from the various wheats grown in this field are to be seen in the following table:—

*Wheat Varieties in Field 6, 1916.*

| Variety. | Area. Acres. | Yield. Bush. | lbs. | Yield per Acre. Bush. | lbs. |
|---|---|---|---|---|---|
| Federation | 36·75 | 938 | 30 | 25 | 32 |
| Yandilla King | 59·37 | 1,266 | 23 | 21 | 20 |
| Baroota Wonder | 87·09 | 1,439 | 17 | 16 | 32 |
| Cumberland | 46·24 | 754 | 29 | 16 | 19 |
| Silver Baart | 93·45 | 1,280 | 16 | 13 | 42 |

The yields per acre of the wheat grown at this farm since its inception in 1908 have been kept, and these, with the farm average for the eight years, are to be found in the following table:—

*Wheat Returns—Veitch's Well, 1909-1915.*

| Year. | Rainfall. | Area. | Total Yield. | | Yield per Acre. | |
|---|---|---|---|---|---|---|
| | In. | Acres. | Bush. | lbs. | Bush. | lbs. |
| 1909 | 14·45 | 22·00 | 396 | 0 | 18 | 0 |
| 1910 | 16·19 | 197·50 | 2,156 | 0 | 10 | 55 |
| 1911 | 13·36 | 620·90 | 5,080 | 30 | 8 | 11 |
| 1912 | 11·57 | 569·00 | 5,544 | 18 | 9 | 45 |
| 1913 | 14·95 | 791·40 | 4,742 | 28 | 6 | 0 |
| 1914 | 6·24 | 951·00 | 325 | 30 | 0 | 21 |
| 1915 | 9·83 | 602·11 | 6,681 | 51 | 11 | 6 |
| 1916 | 16·69 | 407·74 | 7,102 | 20 | 17 | 25 |
| Means | 12·91 | — | — | | 10 | 13 |

The returns obtained from individual varieties at this farm comparatively to the general farm average for the separate years are shown below:—

*Yields of Varieties of Wheats—Veitch's Well, 1910-1916.*

| Variety. | 1910. | 1911. | 1912. | 1913 | 1914. | 1915. | 1916. | Means, 1910-1916. |
|---|---|---|---|---|---|---|---|---|
| | B. L. | B. L. | B. L. | B. L. | B. L. | B. L. | B. L. | B. L. |
| Baroota Wonder | 24 0 | 7 55 | 8 29 | 8 27 | 1 18 | 12 43 | 16 20 | 11 19 |
| Yandilla King .. | 21 0 | 6 0 | 9 14 | 9 6 | Failure | 10 2 | 21 8 | 10 56 |
| Federation ..... | 16 41 | 8 16 | 10 53 | 5 48 | 0 1 | 6 48 | 25 33 | 10 34 |
| King's Early ... | 15 0 | 7 5 | 9 38 | 4 26 | Failure | 13 26 | 16 9 | 9 23 |
| Cumberland .... | 14 27 | 9 23 | 11 5 | 6 15 | 0 7 | 7 51 | 16 26 | 9 22 |
| Silver Baart ... | 9 30 | 8 9 | 8 8 | 6 41 | 0 19 | 9 48 | 14 13 | 8 7 |
| Queen Fan ..... | — | — | — | — | — | — | 22 56 | — |
| College Eclipse.. | — | — | — | — | — | — | 20 18 | — |
| Walker's Wonder | — | — | — | — | — | — | 18 41 | — |
| Late Gluyas ... | — | — | — | — | — | — | 17 53 | — |
| Gluyas......... | — | 6 56 | 9 54 | 5 4 | — | — | 16 54 | — |
| Bearded Gluyas. | — | — | — | — | — | — | 13 57 | — |
| Red Russian .. | — | — | — | — | — | — | 13 12 | — |
| Farm average .. | 10 55 | 8 11 | 9 45 | 6 0 | 0 21 | 11 6 | 17 25 | 9 6 |
| | In. | In. | In. | In. | In. | In. | In. | In. |
| Rainfall........ | 16·19 | 13·36 | 11·57 | 14·95 | 6·24 | 9·83 | 16·69 | 12·91 |

## EXPERIMENTAL PLOTS.

Most seasons, manurial and rate-of-seeding tests with wheat have been conducted on the farm, and for the past two seasons these experiments have been conducted on the same, so that the results can be tabulated together, and will possibly prove useful until permanent experimental plots are in going order. Silver Baart wheat was used this season in both series of plots, and the results for the past two seasons are to be seen in the two tables following:—

*Quantitative Fertiliser Tests—Veitch's Well, 1915-1916.*

Tests on wheat sown at rate of 60lbs. per acre—

| Fertiliser per Acre. | 1915. | | 1916. | | Means, 1915-1916. | |
|---|---|---|---|---|---|---|
| | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. |
| No manure | 11 | 52 | 13 | 39 | 12 | 45 |
| ½cwt. superphosphate | 13 | 15 | 17 | 7 | 15 | 11 |
| ¾cwt. superphosphate | — | | 17 | 40 | — | |
| 1cwt. superphosphate | 13 | 43 | 18 | 49 | 16 | 16 |
| 2cwts. superphosphate | 13 | 40 | 18 | 32 | 16 | 6 |
| 3cwts. superphosphate | 13 | 19 | 21 | 31 | 17 | 25 |
| Farm average | 11 | 6 | 17 | 25 | 14 | 15 |
| Rainfall | 9·83in. | | 16·69in. | | 13·26in. | |

*Quantitative Seed Tests—Veitch's Well, 1915-1916.*

Tests on wheat sown with 1cwt. of superphosphate per acre.

| Seed per Acre. | 1915. | | 1916. | | Means, 1915-1916. | |
|---|---|---|---|---|---|---|
| | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. |
| 30lbs. wheat | 9 | 47 | 18 | 9 | 13 | 58 |
| 45lbs. wheat | 10 | 9 | 19 | 1 | 14 | 35 |
| 60lbs. wheat | 10 | 45 | 19 | 5 | 14 | 55 |
| 80lbs. wheat | 9 | 57 | 18 | 39 | 14 | 18 |
| Farm average | 11 | 6 | 17 | 25 | 14 | 15 |
| Rainfall | 9·83in. | | 16·69in. | | 13·26in. | |

# SOILS OF THE SOUTH-EAST.

## DRAINAGE, LIMING, AND CULTIVATION.

At the Conference of South-Eastern Branches of the Agricultural Bureau Mr. L. S. Davie (manager of the Government Experimental Farm at Kybybolite) delivered the following paper, giving impressions gained from experience in working land at Kybybolite. Mr. Davie said:—

In character the Kybybolite soils range from chiefly light loams to heavy loams overlying ironstone gravel on a stiff clay subsoil, but the layer of ironstone gravel is not always present. We also have a fair percentage of what is known as crabhole country, which has a large percentage of clay in the surface layers. The particles of soil are very fine, and they tend to run together under wet conditions, and to set extremely hard when dry. The winter rainfall of the district is fairly heavy, and the nature of the soil, together with the general flatness of the country, tends to a more or less waterlogged condition during that period, the ground usually being saturated all the time. These natural conditions cannot give good results from pastures or from cultivated crops; the excess of water has robbed the soil of essentials necessary to fertility and good mechanical condition. The unsuitable mechanical condition is due to a deficiency in lime, the original supply of which has been leached out in those long periods in which the soils have been subject to saturation. The sourness of the soil is also due to this deficiency, which allows of the accumulation of injurious acids, produced from organic matter and from chemical reaction in the soil, and which require lime as a neutralising agent. Although lime dressings are necessary to produce the greatest degree of fertility in our soils, we cannot get satisfactory improvement from any application if we expose it to the same action as has already depleted the available supply; which brings us to the fact that drainage is the first necessity in the improvement of these soils.

## DRAINAGE.

Drainage will not only enable us to use lime, but it allows of proper æration of the soil—a condition necessary to the chemical activity responsible for a large proportion of the available supply of plant foods. On the Kybybolite Farm, Mr. Colebatch inaugurated a system of open drains for carrying off the surplus water, which is cheap, and within the reach of all who are alive to the benefits to be obtained. We now have 19 miles of these drains, which are situated so as to take off the excess water as quickly as it is possible to do so. The open drain, although going a long way towards the desired end, cannot possibly be as effective as the more complete systems of older countries, and the relative cost and effectiveness of different methods will probably be tested at Kybybolite in the future. The effect of drainage is to remove the main factors hostile to fertility, and we are then able to supply the deficiencies of the soil. The main requirement is lime, which we previously noted, and this will now give its maximum benefits. Following drainage and liming we get a wonderful improvement in the mechanical condition of the soil, which will allow of better methods of cultivation, an important factor in improving fertility. We find that our soils will also respond well to dressings of farmyard manure; as an example, the first year's results from our permanent manurial tests with wheat which have been laid down on virgin soil, show 20bush. to 11bush. in favor of the best plot, including stable manure, as against the best result from any quantity of super. alone. Such a wide difference may not be maintained when the treatment extends over several years, but it goes to show what the addition of organic matter will do in the direction of increasing fertility.

## METHODS OF CULTIVATION.

We have on the farm two series of permanent experiments dealing with cultivation methods, viz., a test of the different seasons for ploughing and fallowing, with more or less cultivation on the fallows, and a depth of ploughing test. The difficulty experienced in working our soils at various periods of the year has led to a great variety of practice as regards cultivation, hence the necessity for the first-mentioned test. This test includes:—Annual cropping, alternate cropping without fallow; autumn fallow, without cultivation; autumn fallow with spring cultivation; autumn fallow with spring cultivation and summer cultivation. Winter Fallow—Winter fallow with spring cultivation; winter fallow with spring and summer cultivation. Spring fallow—Spring fallow with spring cultivation; spring fallow with spring and summer cultivation. Summer Fallow—Summer fallow with summer cultivation. The average results for four years have been in favor of spring fallow with one spring cultivation. The same treatment, with an extra summer cultivation, is only slightly behind, and very little above winter fallow, with both spring and summer cultivations. The results without fallow are much below these, and point to the fact that in the present condition of our soils, some form of fallow is necessary in average seasons. The figures up to the present also point to a danger of overworking fallows, thus producing that state at which they tend to run together and set down hard with the first rains. In the permanent depth of ploughing test, two years' results have been obtained. Last year they were in favor of the deepest ploughing in each season included in the test, *i.e.*, winter and spring fallow and autumn ploughing, but the average for two years has somewhat modified these results, making 4½in. and 7½in. about equal for first position, with 3in. ploughing still the lowest of any. The results do not extend over a sufficiently long period for a definite statement, but it would appear that ploughing to a depth of 4½in. is necessary, and certainly no harm will result from deeper workings. From experience gained cultivation methods have been confined to spring ploughing for fallow, and in this operation turning the ground up to a good depth, never less than 4½in. After the first spring working subsequent cultivations are restricted to those necessary to kill weeds. All land available is put under fallow, the cultivation helping to sweeten the soils. We do not need fallow from the point of view of water conservation, therefore spring-grown crops, grown on fallow to as large an area as possible, will help in the improvement of the soil to a large extent. Sorghums and millets are the most profitable of the fallow crops that have been tried up to the present, and although we cannot claim to have grown anything like heavy crops, the effect produced by the extra stock carried, the extra manure added with the crop, and the sweetening of the soil, together with the increased production of available plant foods through the extra cultivations, has a very definite value in future production. As our soils improve under the various treatments we are discussing, cultivation will become easier as we approach the ideal physical condition of soil, and then it is safe to say that fallow in this district will be unnecessary. At present we aim at keeping as much land as possible under cultivation, despite the difficulties of working, for the purpose of producing a more rapid improvement in the land, and, in consequence, considerable areas of stubble land are each year broken up for seeding.

I have mentioned the remarkable results accruing from the addition of organic matter to these soils, and for that reason, apart from the fallow crops before mentioned, the growing of crops to increase the stock-carrying capacity of the land is an important item. It is our fixed practice to sow certain green feed areas as early in the season as practicable, chiefly with a mixture of rye and oats, for the purpose of providing winter and early spring feed.

### KALE CROP.

The best purely fodder crop we have yet grown is thousand headed kale. This is not a fallow crop, but is seeded in the spring, and is carried over two summers. The stock-carrying capacity of this crop is very great—in the vigorous growing periods it is enormous. A valuable point about it is that a good growth can be reserved for any time of the year that it may be specially required. This crop is therefore of great value in itself, and, for that reason, must commend itself to the district, but indirectly the great increase of stock carried will increase the soil fertility to an extent which will be realised in the succeeding crops, and must be realised by the farmer if he is going to make the most of his land. Peas have also proved a very profitable crop in our experience, and its well known soil-improving qualities common to all the legumes, make it specially applicable to our requirements. As we realise the importance of increasing the livestock carried on our land, the idea of feeding the grain produce more extensively to our stock will come into prominence. The high prices at present ruling for stock must emphasize this point from a purely money-making point of view. This is especially so in the case of oats, to the growth of which our district is suited, but the demand for which is limited. What better then than to increase the stock on the farm and feed to them—a profitable method, and also one which will greatly help in improved production all round.

### SUMMARY.

In summarising these remarks on Kybybolite soils we find—

Firstly.—That they must be drained.

Secondly.—The greatest improvement after drainage will be found in the use of lime. Until sufficient lime is present, the maximum results cannot be obtained.

Thirdly.—The most intense cultivation possible should be practised to sweeten the soils and increase the supply of available plant foods by means of æration through the repeated workings necessary for the various crops, and to enrich the land by the manures used.

Fourthly.—The growth of the fodder crops from the practice of more intense culture will provide for an increase of organic matter through increase of stock carried, as will also the feeding of grain produce. Organic matter should be added in every way possible, as in comparison with any other single treatment it gives the greatest increase in fertility.

# AGRICULTURAL BUREAU.

## CONFERENCE OF SOUTH-EASTERN BRANCHES.

The annual Conference of the South-Eastern Branches of the Agricultural Bureau was held in the institute at Bordertown on Wednesday, April 4th, 1917. Mr. A. A. Fisher, President of the Tatiara Branch, presided. There were also present on the platform Hon. C. Goode (Minister of Agriculture), Mr. G. Jeffrey (Vice-President of the Advisory Board of Agriculture), Professor A. J. Perkins (Director of Agriculture), Mr. W. J. Colebatch, B.V.Sc. (Agric.), M.R.C.V.S. (Principal of the Roseworthy Agricultural College), and Mr. H. J. Finnis (Acting Secretary of the Advisory Board).

### WELCOMING VISITORS.

The Chairman said that, being President of the Tatiara Branch, it was his honor and privilege to welcome the delegates and visitors to that conference. He was indeed pleased to see so many there. He trusted that the conference would benefit all of them. They were faced with terrible burdens, which they had to carry, and it was only by attempting to produce everything that they could produce themselves that they were going to meet the financial difficulties which were before them. They had, in Australia, the greatest and best land the sun had ever shone on; but so far their development had only just skimmed around the sea coast. They saw by the exhibits around the hall what the district could produce, and they should realise that almost every farmer could produce goods of the same character, and that would show the possibilities of their soil. He called on the Minister of Agriculture to open the Conference.

### OPENING ADDRESS.

Hon. C. Goode, Minister of Agriculture, said that it afforded him very great pleasure indeed to have the opportunity of opening the Agricultural Conference in the South-Eastern District for the second time during his term of office. He hoped that the outcome of the Conference would be that they would all learn something. The man who went to a Bureau Conference thinking that he knew everything which was to be known, was not much use to the Conference. In the development of agriculture and the science in connection with that industry they had still a lot to learn. Although the Chairman had referred to the experts present there that day, he was sure that the experts recognised that they were really in school themselves. They did not claim to be "knowalls," and to have solved all the problems which were to be solved in connection with agriculture. All of those present could, by experiments on their own holdings, by improved practices, and by avoiding mistakes, do much in the direction of adding to their own individual resources, and to the welfare of the whole community. The Chairman had struck the right note when he said that they had big problems in front of them, and if they were to bear the big burdens brought upon them by the war, it would be by winning increased wealth from the land. The Government would give special encouragement, so that the men on the land could make every possible success on their holdings.

### CLOSER SETTLEMENT.

They should go in for closer settlement more in the future than in the past, because if they had to hold that country they had to populate it. During the last two years the Government had bought several estates, and they had bought one in the vicinity of Bordertown, the deal having been closed the previous day. In the Nalang Estate they would settle farmers, who would add to the wealth of the district and the prosperity of that town. They were pressing on with a vigorous policy along the River Murray reclamation areas, with the same object in view. With respect to the men who had gone to the front and come back partially maimed, they must see that they got profitable occupation—they must see that they had the opportunity to make a fair living in the future. They had at Pompoota a number of men who had been allotted blocks in connection with the reclamation areas. They were engaged in dairying. They hoped to be able to do a great deal along the banks of the Murray for the soldiers, and so contribute to the general welfare of the State. At Mount Remarkable they had established a soldiers' training farm, where cereal growing, stock raising, and mixed farming would be carried on. They had in Mr. Hodge, who was in charge, a capable man, who had been farming in that district under diverse conditions, and they were glad to be able to secure his services. He was doing good work.

### PROBLEMS OF THE SOUTH-EAST.

In the South-East they had problems peculiar to the district. That end of the Tatiara was more fit for cereal growing and stock raising; but in the more fertile areas to the south—he referred more to the volcanic areas and the swamp lands, those which had been and still remained to be drained—there were possibilities of further development. It was not only to encourage the settlement of the people on the land, but also in the interests of the land, that every individual, although having only a small holding, should bring forth the greatest possible produce. He had heard it said that some landholders in the South-East were doing too well, and were content to go along in their own methods, earning sufficient for their own needs, and did not go in for intense culture as they might. That might be right, but he hoped that every man would recognise his duty to make the most of the land he occupied. Though a man, by the employment of more labor, intense culture, rotation of crops, or summer crops, might not see a very big profit for the extra labor, yet he should realise that he was contributing to the general wellbeing of the community and the wealth of the country. If they would only make that principle apply to their daily avocations, a great deal more could be done in the way of increasing production and augmenting the natural resources of the country. He did not know whether irrigation had been tried to the extent it might in the South-East, but he had an inquiry from the South-East whether the Government would give assistance in putting in an irrigation plant in connection with a private individual's own holding. In the coming session the Government was bringing in a resolution to authorise the giving of financial assistance for the installation of individual pumping plants for people to develop their own holdings in that direction. It would, of course, be necessary for an officer to report whether the conditions were suitable, and whether he possessed an adequate water supply. Given those two conditions, the Government was satisfied that it would be justified in financing a man with a pumping plant, the payment for which would be spread over a number of years, so that he might improve his land and increase his production. In the South-East there were limitless possibilities of production, and the Government hoped by the system of drainage to devote a considerable area to closer settlement, and hoped that there would be an increased population growing up under prosperous conditions. The district had done remarkably well, and was capable of much greater development, beyond their loftiest dreams, because people did not realise the wealth they had locked up in the volcanic and drainage areas in the South-East.

### Imported Dairy Cows.

The Government recognised that something would have to be done to encourage the dairying industry. During the last few months 500 dairy cows had been imported from the eastern States. They were requiring cows for the soldiers' settlements. The Government was financing the soldiers, and cattle were supplied to them on easy terms of redemption. It was considered better to get the cows from the eastern States than in South Australia; as they purchased at a better price than locally, it was saving money and adding to the dairy cattle in South Australia. He had to apologise for the absence of Mr. Suter, who had gone to the Sydney stock sales. It was a suitable opportunity for securing stud stock of good milking strains. He would purchase young animals, and among other things a stud bull for the people of Mount Gambier. The Branch would recognise that the Government was losing no time in securing what they desired, and he hoped that what the Mount Gambier Branch was doing would be taken up by the other Branches throughout the State.

### Profit in Pigs.

Hand in hand with dairying there was usually the pig-raising industry. Every farmer should know that there was profit in pigs, if properly handled. While they had a difficulty in getting rid of their wheat, and there was so much damaged wheat in the country, the farmers should go in more for the grain feeding of pigs. In the past there had always been the danger of over-supplying the market, and then everyone wanted to get out, and prices were ruinous; but in order to avoid that, the Government was prepared to give a fixed price for pork at the Produce Depot. The object was to encourage the development of the industry and establish it on a firm basis, so that the farmers could go ahead with the production of pork, assured of a definite return. The Minister of Industry was preparing a circular setting out the terms on which the Government was prepared to take in pork. The price offered would leave a good margin of profit, and there need be no fear among those going in for pig raising that production would be overdone, and that there would be a glut in the market. They hoped to make arrangements which would be of benefit to the people in England, to whom the pork would be exported, as well as to the people of South Australia. He desired, on behalf of the Government, to say that it was prepared to do all it possibly could in every direction to encourage rural settlement and increased production.

### LIME CRUSHING PLANTS.

In connection with the South-East, in much of their land, particularly around Kalangadoo and Bordertown, and country of that class, liming of the soil would have to be carried out much more in the future than it had been in the past. He did not know where it had been carried out extensively in the South-East, except on experimental plots. The Government was considering the question of supplying crushers for the purpose of crushing lime and encouraging its utilisation. In New Zealand they carried lime free on the railways, and it was a profitable arrangement, because of the increased traffic and the improvement of the land. Much South-Eastern land had a tendency to run together and set tight, but he hoped that there would be an improvement in the future: He was glad to notice that the trend of affairs in connection with the war had been more favorable during the past few weeks, and they could look forward with some degree of confidence to the close of the war before they met again; but whether it ended or not, he was sure that the people of that country were prepared to stand behind the Allies and see the thing through to the bitter end. They should not be satisfied with any peace, except a peace on honorable lines and a lasting peace. If it was peace without the power of Prussian militarism being crushed, it would only mean another war in a few years. They desired to make it impossible for German aggression to ever menace the peace of the world again. It was the duty of each and all of them in South Australia and the Commonwealth to show that they were behind the Mother Country, and they would have an opportunity of doing that during the next few years. He hoped that those who had influence would use that influence on the side of the Mother Country. South Australia's interests were wrapped up in the Mother Country, and he was satisfied that the people of that district would rally round the Mother Country in her hour of peril.

## LIVESTOCK IN THE SOUTH-EAST.

Professor A. J. Perkins, Director of Agriculture, said that he was unfortunate in not having had time to prepare an address on any subject which might particularly interest them. One of the new duties which had been cast upon him had reference to the purchase of the Mount Remarkable Estate, where they were settling returned soldiers, and that took up time. He had endeavored to have a few of the questions which were to be brought before the Free Parliament submitted to the secretary before leaving for the Conference, but, unfortunately, the questions sent along were limited in number, and did not afford much scope for developing an address. He was anxious to discuss questions which would be of local interest, and he would be glad to deal with matters which would help them in the difficulties with which they were struggling. The practice of submitting questions beforehand had been tried in other districts, and had proved very satisfactory, because it had afforded time to work them up into an address and deal with them more efficiently than when sprung upon one in a public meeting.

If there was one part of the State which should be settled and peopled to the utmost it should be the South-East, because rainfall represented such an essential feature in the production of crops. Settlement had taken place in the far west, but not to the same extent as in the South-Eastern districts, where it was necessary to employ a large amount of capital—he did not mean unprofitably—but it involved the outlay of more money than the average settler possessed, much more than a settler in the mallee country usually had at his disposal. A man might start in the mallee country with very little, and, given a few good seasons, he would be on his feet almost immediately. If, however, they took up land where the rainfall was abundant, as it was in a good many parts of the South-East, they would find, in country of that sort, the farming was a very different proposition, calling for initial capital, which was difficult to obtain. He trusted that the Minister, when he had occasion to discuss the agricultural policy of the Government, would take into consideration the operations of those who had to start in a country which required a comparatively large amount of capital. It seemed to him that, if money could be advanced on easy terms for special purposes, there was no greater call or more reasonable call than in those districts where farming absorbed more than the average man could lay his hands upon. He wished to refer specially to farming practices in a district such as that. In the course of the last 15 years he had numerous instances of the difficulties of the average farmer endeavoring to combine with farming operations the handling of livestock. If it could be said that livestock was profitable on farms in the Northern Areas, he was positive that, so far as the South-Eastern districts were concerned, it was not merely a question of combining livestock with the growing of crops, but that all of the farmers in those districts should build up their farming around livestock operations. In a sense, on every farm, as far as he could see the position in that district, livestock ought to be the pivot around which everything else should work. He did not mean that they should not raise crops like wheat, oats, barley, or rye, according to the characteristics of the district, but instead of those crops taking the leading part in their farming, they ought to occupy a secondary position. Additionally, these crops would always benefit in growth and yields from the presence of a large number of livestock on the farm. Sometimes there was a tendency to imagine that what one had in view was a series of small stations, with huge paddocks, and perhaps a few boundary riders here and there; but anyone who took the trouble to think would know that that was quite an erroneous idea. He was satisfied that, given that the South-East was developed on the basis of livestock farming, it would carry a denser population than the Northern Areas on a basis of wheat growing. He did not wish to enter into details as to any particular kind of livestock in the district, because if they took the whole of the district from one end to the other, all kinds would do, though in some districts some forms of livestock would be more at home than others. Of all forms of livestock, however, the one likely to do most good was dairy cattle.

### DAIRYING AND PIGRAISING.

It was a surprise to him that, even in the more settled portions of the South-East, dairying was not more practised. It was often said that South Australian farmers did not like dairying, that, among other things, they objected to the milking. There might be something in that, but he had always felt that, if it were possible for the farmers to be less suspicious of one another, and endeavor to co-operate, they might make dairying a more interesting and more profitable undertaking. Along with dairy cattle there was the pig industry, and he noticed with pleasure that the Government proposed fixing a definite price for pork, with a view to the export of bacon and ham. He would like to point out the enormous quantity of cured pork, bacon, and ham imported annually by Great Britain, and it seemed an anomaly that Australia did not participate in that trade. British annual imports of that character for five years before the war totalled £19,000,000. The countries that did most of that business were not countries which had cheap labor, the chief exporter being the United States. Without wishing to rob the United States, whose share of the trade during the period mentioned was £8,000,000, Australia should contribute to the supply. Canada exported something like £1,500,000, and so on. If they could develop the pig industry, knowing that there was an assured market, and that there was a profit to be made in pigs, then a successful time was ahead of the industry.

### SHEEP.

In regard to sheep, he did not know the South-East sufficiently well, perhaps, to say definitely that those districts would be able to compete in the production of early fat lambs for export purposes. He did not think that that was likely to be the case. He referred to the results at Kybybolite, which, in that particular direction, had not shown to advantage. They found that the lambs did not come off their mothers fit for export purposes—they needed topping up, in the same way that they were topped up in New Zealand and different parts of England. That was a matter of feed; but if they could not get early fat lambs, as in the Northern Areas, there were other purposes to which the sheep could be put. If they conducted livestock farming on the lines he had indicated, their farming operations would have to be different from those in the north. He did not think that they would give a preponderating position to cereal crops, because they would need forage crops, which would be sown chiefly with the object of feeding livestock. About two years ago he had occasion to speak of forage crops at Mount Gambier, and it was unnecessary to go over that again; but forage crops would require to be grown more extensively than at the present time. Some forage crops suited that district, such as kale, which had been successfully grown at Kybybolite, and he had grown it at Roseworthy under favorable conditions—that was in a season like the present, with early autumn rains. Then there were mangolds, millet, and sorghum. In the present season they had grown a crop of Soudan grass, which had made good growth, and was likely to prove a good forage crop for the district. Peas also provided a forage crop, which could be utilised to a far greater extent than it was at the present time. Lucerne also would do, wherever the conditions were favorable, and there were others which might be tested. He was sure, in the conditions existing, with their rainfall and soil, they could grow forage crops which would be profitable food for livestock. There was another form of husbandry on farms of that description which could be availed of, and that was the laying down of temporary pastures. The land could be sown with a mixture of grasses for a period of time, say, three, five, or six years, which was infinitely preferable to depending solely on rubbish and the growth which sprang up spontaneously. It was to be hoped that when they took to handling livestock on small estates, they would make provision a year ahead for their wants. There were various ways of doing that. They could provide ensilage. The Minister was in sympathy with the scheme, and Mr. Suter had advocated it. Assistance should be given dairy farmers to put up ensilage silos, in which could be stored material that could be used when feedstuffs were unobtainable. Grain could also be fed to livestock in various districts, and he did not know that it was not one of the cheapest forms of food, when combined with a certain amount of grazing. Handling the land as he had indicated necessitated a good deal of hand feeding, because grazing would not see them through. If they depended on grazing alone, they could have only a small number of livestock, and they could not make them the centre of their operations. For any type of livestock grazing should be incidental, and handfeeding should be the rule. That added to the initial expense of the farm. There was not only the question of securing the livestock, but also of subdividing the farm into small paddocks. Water had to be placed in every field, and conveniences such as troughs had to be provided, all of which meant a very big initial outlay. The South-East could not develop thoroughly until the people were ready to take it up on the lines he had indicated. It had been stated that the South-East, whilst excellent country for fattening, had proved itself unsatisfactory in the development of young stock. He thought that there was some foundation for that, possibly not from the point of view of climate, but of soil, from deficiency in lime and phosphates.

### IRRIGATION.

There was the question of irrigation to which he would also like to refer. Irrigation had, in the great majority of cases, succeeded only in the form of closely knit colonies having common interests. That was because the cost of handling water was reduced to a minimum, and they worked as communities and not as individuals. There were places where individuals might succeed in the South-East, but he would like to have an opportunity of testing the matter depart-mentally. There was, in some places, excellent underground water within very easy reach of the surface. If that water could be handled by the comparatively cheap pumps which existed nowadays, they could have a number of crops on small areas; but though it would mean more labor, they must come to recognise, not that they must do with as little labor as possible, but with as much as was economically possible. If they tackled irrigation problems they must use hand labor. The first crop which came to their minds in regard to irrigation was always lucerne. If lucerne were put in, there would be very little to do afterwards. It was excellent, and where there were dairy herds it could not be bettered. There was also maize growing for grain and for forage crops. Maize depended on summer rains. But in the South-East, if water were available within reasonable distance, they could grow a summer crop which would be more profitable than a winter crop. Maize gave profitable yields up to 50bush. and 60bush. and even 100bush. per acre. They would get more from an acre irrigated than from 10 acres of winter crop.

## FREE PARLIAMENT.

### DESTRUCTION OF FOXES.

Mr. J. M. Wray (Naracoorte) referred to the damage done by foxes. The loss sustained in lambing was very serious. He suggested that the farmers should co-operate and lay poison for the foxes during the months of March and April, before the lambing commenced. In that way the foxes would be got rid of before they could do much damage.

Professor Perkins said that there had been trouble with foxes at Roseworthy; but the only successful method of combating them was by laying poison a couple of months before lambing commenced. They had either to do that or consider the question of bringing the lambs in at night.

Hon. C. Goode suggested that they should call a meeting of the residents if damage were being done, and then determine on some united action within the district, with a view of killing the foxes.

Mr. A. Bradley (Kybybolite) suggested that each Branch should decide what should be done in each district, and that course was agreed upon.

## IMPRESSIONS GAINED FROM WORKING FRINGE COUNTRY OF SOUTH-EAST.

Mr. S. Ockley of the Penola Branch, contributed the following paper:—

The grey sandy loams, timbered mostly with the different eucalypts, varying between red gum and stringy bark and interspersed with patches of yacca and bracken, known as "fringe country," cover a considerable area of the South-East, and although it is generally considered that their best usage is wool growing, still economic conditions have altered so much of late years, that the plough can now be profitably used. These lands have incurred a condemnation which they do not deserve from many who have attempted grain and hay growing on them. They have the reputation of becoming useless for cultivation after a year or two, through being overrun with sorrel, and of being unable to fatten; which is true enough to those whose extent of farming experience is growing a hay or grain crop and keeping as many sheep as the uncultivated land will carry. However, such management only accentuates the most conspicuous disadvantages of light land, viz., stagnation during winter, due to super-saturation and the poor feeding value of the natural grass. The great advantages of the sandy loams are the retention of moisture during the summer, the early and sure germination during early autumn, and the ease of working, except when the ground is too sloppy. To use these advantages, it is easily seen that the production must consist of the growth of fodder crops, and the avenue for turning them into £. s. d. is their utilisation by sheep, although dairy cows will turn the produce into profit. Still, one has to work too much country for convenience in daily attendance to dairy work, whereas roomy conditions are the best for sheep.

## Fodder Crops.

This theme of fodder growing is on every farmer's lips at present, especially in relation to sheep farming, and the economic advantages of combining sheep and tillage are fully recognised both by hitherto wheat farmers and graziers. It must be admitted, however, that the fodder crops that are grown are rather spasmodic productions, occupying a very small percentage of the farms, and not forming a definite place in the crop rotation. But for the successful occupation of the fringe lands (it must be explained that my references deal with a 26in. rainfall, although this may apply to lands of less annual fall) forage crops must be the primary production, grain only secondary; and in order to carry more stock than the pasture and stubbles would ordinarily support, it is necessary to have some pre-arranged system, lest one find himself with double or treble the stock than the land is ordinarily capable of carrying, without having made provision for such a contingency months beforehand. For a man who could command sufficient capital to equip himself with six horses, a 4-furrow plough, drill (13 disk), binder, disk cultivator, and harvester, and 600 breeding ewes, a suitably-sized farm would consist of 1,000 acres of land, valued at £2 per acre, or perhaps a little less, out of which, say, 600 acres would be suitable to cultivate, the remainder consisting of a few swamps and patches of bracken land too poor to plough, as is nearly always the case in fringe country.

The boundaries must be netted; big expense in clearing avoided; all litter on the ground, and trees smaller than 14in. in diameter burnt. Useless green timber should be rung. The essential is to get the land turned up as quickly as possible, as the natural grass is not of much value.

The area should be subdivided into three sheep-proof paddocks, each containing as nearly as possible 200 acres of land, fit to cultivate and break up. One paddock should be seeded with half oats, half wheat, which requires to be finished by the end of May. A normal winter generally puts an end to tillage operations on light land by June. As soon as the ground allows it after winter, plough paddock No. 2. Work it down in early October, and drill in Eclipse maize at the rate of 10lbs. per acre, which is about the amount sown if the maize is put through the oat chutes, with the regulator standing at 1bush. per acre, and three chutes out of every four blocked. Thus, with a 13-chute drill, the seed will come out of the 1st, 5th, 9th, and 13th chutes, consequently on the return trip of the drill it will be necessray to allow a couple of feet to keep the rows a sufficient distance apart, which, of course, means that a much larger area can be covered per day than is the case in drilling wheat or oats. In October daylight 20 acres per day can be averaged. It is most important that the seed should not be sown thickly, as thick sowing overtaxes the available moisture in the soil during summer, just as two sheep to the acre overtax land suitable only to carry one per acre. Also a thick growth, even were it a success, would help to spoil the benefits of the ploughed land as a fallow. The object is to grow some fodder on the fallow to maintain the stock during autumn, since the maize is available for stock by mid-February, and to regulate the feed, if necessary it would suffice only to allow access to the crop by the sheep during a portion of each day, since the object is not to fatten but just to maintain the breeding ewes. It is important that maize should have reached the cobbing stage before being fed.

As soon as possible after the crop in paddock No. 1 is harvested and grain carted, the 100 acres of wheat stubbles should be disked, and oats drilled in at rate of 1bush. or 1½bush. of seed and about 40lbs. of super. per acre to catch the first rains in March, so that a large amount of feed will be available for the ewes as they lamb. Here lies one inestimable advantage in light land, you may get a good germination with a comparatively light fall of rain in February or March, and need have little or no fear of the young stuff withering off. Oats grow rapidly when drilled on shallow-worked ground; also whenever it is intended that stock should feed on cultivated ground during winter, the deeper the working the more will the stock puddle and spoil the ground.

The first week in May (by which time the ewes willl be finishing the maize butts) should see the drill at work on the maize fallows, drilling in the oats and wheat. A chain will cover the seed. If April has been wet enough to consolidate the ground the cultivator will be required ahead of the drill.

The next work for the teams is to plough paddock No. 3, in August and September, to be sown with maize in October, which crop will be followed by grain, then by 20 months stubble grazing to complete the three years, when the rotation commences again.

The following table will better explain the utilisation of the paddocks:—

| No. 1. | No. 2. | No. 3. |
|---|---|---|
| First Year. | | |
| Grain—May-Dec. | Grass—Jan. to Aug.<br>Maize fallow—Aug.-Dec. | Grazing. |
| Second Year. | | |
| Grain and stubbles—Jan. and Feb.<br>Green feed—Mar.-Dec. | Maize—Jan.-May.<br>Grain—June-Dec. | Grazing till Aug.-Dec. |
| Third Year. | | |
| Grazing—Jan.-Aug.<br>Maize fallow—Aug.-Dec. | Grain and stubbles—Jan. and Feb.<br>Green feed—March-Dec. | Maize—Jan.-May.<br>Grain—June-Dec. |

It will be seen that over a course of three years each paddock produces a crop of maize, one of grain, and one of green feed, as well as 10 to 12 months of grazing, and to explain the benefits of the rotation it will be advisable to compare the following table regarding the disposal of the stock designated as ewes, bought when the stubbles become available, *i.e.*, February of second year.

Second Year.

| No. 1. | No. 2. | No. 3. |
|---|---|---|
| Ewes, stubbles, Feb.<br>Ewes and lambs on stubbles and green oats, Aug. to Dec. | Ewes, maize, Mar., Apr., May | Ewes on grass, mid-May to mid-July; as they lamb draft them off into green feed in paddock No. 1. |

A glance at the table will show that all the stubbles in paddock No. 1 are available for the ewes during February and also March if required, although the time they are in there will be determined by the result of the maize crop, and also the earliness of the first rains, when of course the wheat stubbles have to be disked and oats sown. In March the ewes go on to the maize in paddock No. 2, where they remain. (The rams should be joined to the ewes from February 15th to April 15th, or thereabouts.) In May, as the maize fallows are being drilled, the sheep will need to be shifted as the seed germinates in paddock No. 3, which has had no stock whatever since the beginning of the year, and consequently is fresh and in good heart. This paddock is to hold the ewes till they commence to lamb in mid-July. As they lamb draft them off into paddock No. 1, which contains the self-sown oat crop and 100 acres disked in. My records show that the latest date on which my green feed was ready for stock (*i.e.*, about 18in. high) was in 1915, when the autumn was late, and it was July 19th before stock were turned in. In 1914, however, peas and oats were 18in. high by May 31st. It would be as well to give my records of summer rainfall. Since 1910 the average has been—November, 186; December, 176; January, 65; February, 120; March, 105; April, 181.

It is not advisable to lamb the ewes in the green feed, because it only tends to cause the udder to become too full of milk before lambing and the ewe is almost afraid to let the lamb suck. The long wet feed also prevents the newly-born lamb getting up, and moreover it is difficult to see the ewes. A grass paddock with clumps of short bracken is ideal for lambing ewes, as the bracken affords good shelter. By the end of August the most of the ewes with their lambs, will be in paddock No. 1. By October spring will make its presence felt, after which time there is no dearth of feed, and in January the lambs are sold, while the ewes continue a similar routine. The question of sale rests with market conditions. It does not always pay to top up, but usually it does; and in regard to the disposal of oats, topping up sheep or lambs is a profitable avenue. We all know that experienced buyers buy according to estimated carcass weight and quality, and the prime quality realises from ½d. to 1d. a lb. more than good quality. I do not know how many pounds of oats would make a gain of 1lb. of mutton. A healthy pig is credited with increasing 1lb. for every 4lbs. of grain judiciously fed. Allow 10lbs. of oats to make 1lb. of mutton. If one had a lamb of good quality, which would kill 32lbs. at say 6d. per lb., and an additional bushel of oats would increase that weight to 36lbs., at the same time making it prime, and worth 6½d. per lb., the oats would practically return:—

| | s. | d. |
|---|---|---|
| 4lbs. at 6½d. | 2 | 2 |
| Increase of ½d. on the 32lbs. | 1 | 4 |
| Saving of bag and cartage | 0 | 6 |
| Total | 4 | 0 |

It is enlightening to see how such a system spreads the work evenly throughout the year, which approximately would be divided among the following occupations:—

| | |
|---|---|
| January and February | Harvesting. |
| March | Disk in 100 acres oats. |
| April | General work; commence preparation of maize fallow for grain, if necessary; crutch ewes heavily. |
| May | Drilling grain crop. |
| June | Finish drilling; general work. |
| July | Attend lambing ewes. |
| August | Attend lambing ewes; commence fallowing for maize. |
| September | Fallowing. |
| October | Drill maize. |
| November and December | General work, shear, &c. |

With six horses and six-horse implements a man would never require more than a youth to help him on a farm of 600 acres arable fringe country. This system, if applied from the commencement will prevent sorrel getting a hold on the ground, and it will increase the growths of clovers and Cape weed, both good milk makers. The horses are never worked hard, only one ploughing for the three crops, consequently they will do on hay, provided good mangers are made to prevent loss of grain. A horse just leaves enough straw to bed himself down lightly, when hay fed, and my estimate is that 10 tons of hay goes as far as nine tons of chaff.

### A Comparison.

We will compare two other methods of working similar ground with the principle advocated, which would require, roughly speaking:—

| | £ | s. | d. |
|---|---|---|---|
| Seed and super. for 200 acres at 7s. 6d. per acre | 75 | 0 | 0 |
| Seed and super. for 200 acres maize at 2s. 6d. per acre | 25 | 0 | 0 |
| Seed and super. for 100 acres oats green feed, at 4s. per acre | 20 | 0 | 0 |
| Wages and upkeep of youth | 100 | 0 | 0 |
| Incidental expenses | 80 | 0 | 0 |
| Interest on holding and plant, £2,600 at 5 per cent. | 130 | 0 | 0 |
| Interest on sheep, at 10 per cent. | 70 | 0 | 0 |
| Total | £500 | 0 | 0 |

The returns would consist of—

| | £ | s. | d. |
|---|---|---|---|
| Produce of 600 ewes | 600 | 0 | 0 |
| Produce of 200 acres grain | 350 | 0 | 0 |
| Total | £950 | 0 | 0 |
| Leaving a balance of | £450 | 0 | 0 |

An alternate method of working 300 acres grain, 300 acres fallow would entail the same or greater plant, and require the same assistance. There would be more expense of upkeep of plant, as harvesting is the occupation that is expensive on machinery, oil, &c. The expenses on an extra 100 acres of wheat would offset the expenses on the maize and green feed, so the only difference in expenses would be the £70 interest on sheep, which leaves his expenses as £430. Returns could be estimated at 300 acres crop, £525; and say dealing with stock on three months stubbles, £75, equals £600; balance of £170. There would be a rush at harvest time, with danger of rain if late, and the system of bare fallow would tend to impoverish the light land.

The other method of 300 acres crop and 300 grass is worse still, as such would result in plenty of sorrel in a few years; also by the time 300 acres were harvested and the 300 acres ploughed and seeded, the farmer would be floundering in the winter with disastrous results. The ewes that would be kept on the 300 acres grass would be in the one paddock. All the year the grass would never get headway; perhaps 200 might be carried. This is the most unprofitable rotation, yet it is the commonest. The rush of work entails extra expense and danger of loss, which easily outweighs the £70 interest on sheep, and being so generous as to allow that the grain results would be equal to those of the two formerly mentioned rotations, the balance would approximately be 300 acres grain, £525; 200 ewes, £200; equals £725; less expenses, £500; balance, £225.

These approximate figures, of course, depend on the average estimate of results from grain growing and grazing on cultivated crops and grass. That has been my experience, and the estimate that £1 per ewe for wool and lamb could be obtained from aged Merino ewes mated to long-wool rams, and allowing 80 per cent. lambs, at present prices is conservative. Too much importance cannot be laid on the principle of keeping all stock off young grass on light country. If checked at the start headway is prevented. Similarly, on light land, crops will never stand feeding off.

This can only be obtained by having a crop like maize to maintain the sheep without the labor of hand feeding during the autumn. Accepting these figures as reliable, it shows at what great disadvantage is the settler who is not in a position to buy sheep as well as working plant. In fact he could not continue, because under either of the two last-named methods the grain-producing abilities of the land would lessen, although the grazing capacity might increase. The principle advocated would keep the land in good heart, although the farmer requires a knowledge of stock as well as grain growing. To be successful he should have ability to judge the condition of his stock, to say whether they are thriving or not without having to wait until they become poor and weak before he knows it.

### TWO ESSENTIALS FOR SUCCESSFUL OCCUPATION OF FRINGE LAND.

This fringe country cannot be worked with success with wheat as the primary product. The ordinary settler who generally has only sufficent capital to buy working plant, and looks to his produce to maintain him entirely is compelled to apply the system of 300 acres grain, 300 out for fallow, which system results in diminishing results every year, because the problem of purchasing the breeding flock is the killer. The land may be obtained under closer settlement conditions, implements on time payment, but stock requires practically cash, and although stock agents materially assist many men to establish flocks, still their conditions are rather exacting, and the farmer often cannot keep his sheep for a sufficient length of time to obtain the results he should. Although it sounds like asking a lot, if the Government could propound some scheme to assist farmers in this respect, it would advance agriculture, in the South-East especially. Although the procedure may be more difficult, still, with much hesitation and being fully alive to my being comparatively inexperienced in matters pertaining to stock agency business, the following method has presented itself to me as perhaps worth exciting the criticism of the brains of stock agency:—At present an agent supplies sheep to a client on a three months' bill, and in the event of failure of the client the agent bears the responsibility, as he finds the money, consequently the agent uses discretion in such transactions.

Now, say the Government could arrange with a firm or firms that farmers could obtain ewes through them, just as they now receive wire netting through the districts councils, *i.e.*, the Government would find the money, the farmer would inspect the ewes with the agent, if price satisfactory, purchase, in which case the agent would get the usual commission, and be responsible, similarly as the district councils are held responsible, *i.e.*, the farmer would be responsible to the agency firm, and the firm responsible to the Government for the amount of the ewes, instalments at shearing and lambing. Many limitations would undoubtedly be necessary, but it is not an impossible procedure.

Another advantage to settlement of fringe land is facility in obtaining land under closer settlement conditions. At present, only when an estate is purchased by Government and subdivided can one obtain a closer settlement block; but these fringe lands do not appeal to the Government as suitable to buy in bulk, as an estate may be too much interspersed with rough country. What is required is ability for a settler to obtain a block under closer settlement condition without it being necessary to wait until an estate is offered. If an area of virgin land, say the size of one farm, is available and can be obtained at satisfactory price, it would encourage settlement if one could obtain such land on closer settlement conditions, subject to the approval of the Land Board. It may be years before a man can get land under closer settlement conditions if he has to wait until an estate is purchased by the Governmenet in the locality with which he is acquainted, whereas there may be numerous separate areas available, except that he is unable to get terms equal to those which the Land Board give.

### NEXT CONFERENCE.

Mr. J. M. Wray (Naracoorte) moved that the next Conference be held at Naracoorte.

Mr. T. J. Tidy (Naracoorte) seconded the motion, which was carried unanimously.

### VOTES OF THANKS.

On the motion of Mr. S. Shepherd (Kybybolite), seconded by Mr. T. Stanton (Tatiara), a hearty vote of thanks was accorded to the Minister of Agriculture and the officers of the Agricultural Department. The Hon. C. Goode, M.P., responded, and proposed a vote of thanks to the chairman, which was carried by acclamation, and the proceedings terminated.

## DAIRY AND FARM PRODUCE MARKETS.

A. W. Sandford & Co., Limited, report on 1st May:—

BUTTER.—A slight increase in production is to be recorded for the month of April, and there is still a surplus in South Australia of second and third quality butters. However, the London market continues to offer a satisfactory price, and thus values have well maintained. A proportion of our firsts are being received from the eastern States, and prices at the end of April were:—"Alfa," 1s. 6½d.; "Primus," 1s. 6d.; third grade creamery, 1s. 2½d. to 1s. 3½d.; choice separators and dairies, 1s. 4d. to 1s. 5d.; fair quality, 1s. 2d. to 1s. 3d.; store and collectors' lines, 1s. to 1s. 2d. per lb.

EGGS.—A seasonable shrinkage can be reported for the month, and in consequence of this a firming in rates occurred at the last sale, hen selling at 1s. 5d.; duck, 1s. 6d. per dozen.

CHEESE.—Production still maintains, but with good inquiry, both locally and for export, there is no alteration in prices, viz. 8d. to 9d. per lb. for large to loaf.

HONEY.—Substantially heavier quantities have come forward, but market is firm, prime clear extracted selling at 4d. to 4½d. per lb.; second grades, 3d. to 3½d.; beeswax, saleable at 1s. 7d. to 1s. 8d. per lb.

ALMONDS are still short of trade requirements, and the advance reported a month ago continues to hold. Brandis, 11d.; mixed softshells, 10½d.; hardshells, 6d.; kernels, 1s. 8d. to 1s. 9d. per lb.

BACON.—Pigs are very much more plentiful than has been the case for a long time past, the farmers realising that with the cheapness of feed this animal is a profitable adjunct to the farm. The last few pig markets have recorded very substantial increases in supplies. In consequence of this bacon is just a shade easier, so that best factory cured sides are now selling at 11d. to 11½d. per lb.; middles, 1s. 1d.; hams, 1s. 1d. to 1s. 2d.; rolls, 10½d. to 11d. per lb.

LIVE POULTRY.—Farmers are wisely sending in their surplus poultry in view of the good prices now ruling, the catalogues being large, and good prices obtained, especially for birds fit to kill; light sorts selling according to condition. Heavyweight table roosters, 3s. to 4s. each; nice conditioned cockerels and plump hens, 2s. to 3s.; light birds, 1s. 3d. to 1s. 9d.; ducks, 2s. to 3s. 4d.; geese, 4s. to 4s. 6d.; pigeons, 4d. each; turkeys, from 6½d. to 9½d. per lb. live weight for fair to good table birds.

POTATOES have offered very freely, and buyers have had no difficulty in obtaining their requirements from the Adelaide Hills, Mount Gambier, or Victoria. Therefore the closing days of the month found prices slightly lower all round. ONIONS.—Deliveries of locally-grown onions have fallen off considerably, but with plenty offering from the South-East and Victoria; values have not undergone any alteration. Prices—Potatoes, £4 to £4 10s. per ton on rails Mile End or Port Adelaide. Onions, £5 10s. to £6 per ton on rails Mile end or Port Adelaide.

# ADVISORY BOARD OF AGRICULTURE.

The monthly meeting of the Advisory Board of Agriculture was held on Wednesday, April 18th, there being present Messrs F. Coleman (chair), T. H. Williams, A. M. Dawkins, J. Miller, C. J. Tuckwell, Professor Perkins, and the Acting Secretary (Mr. H. J. Finnis).

### WOMEN'S BRANCHES OF THE BUREAU.

The Hon. the Minister of Agriculture intimated the Government's approval to the Board's recommendation in respect to the formation of Women's Branches of the Agricultural Bureau.

### INCORRECTLY NAMED NURSERY STOCK.

The Blackheath Branch requested that steps should be taken to secure the introduction of legislation designed to prevent the supply of incorrectly named stock by nurserymen. It was decided to secure a report on the matter from the Horticultural Instructor (Mr. Quinn).

### WHARFAGE RATES.

The Harbors Board wrote that they could not recommend an alteration in wharfage rates on parcels at outports, as desired by the Upper Eyre's Peninsula Branches of the Bureau. The regulation dealing with wharfage on milk and cream in operation on the River Murray applied to all ports, it was stated. Mr. Dawkins emphasized the necessity for alteration in the rates, because they were crippling production. Even if the Government made a loss on them it would recover the amount in increased development. It was decided to refer the matter back to the Minister, reiterating the Board's recommendation that a reduction should be made.

### WHEAT RECEIPTS.

The Wheat Harvest Board, in response to a request for an expression of opinion on the proposal that agents should supply farmers with receipts showing the individual weights of bags of wheat delivered, reported as follows:—"The wheat merchants who are acting as agents for the Board cannot see their way to issue receipts showing the weight of each bag of wheat delivered by the respective farmers. The rush of work at the time of delivery renders such impracticable. At the same time it is believed that any wheat agents will gladly permit farmers to scrutinize their tally-books and check the additions that are made in securing the total entered upon each receipt."

### EXPERIMENTAL FARM ON THE MURRAY.

It was resolved to forward to the Minister of Agriculture a proposal from the Berri Branch to establish an experimental farm in that district. The Branch pointed out that there were other industries in addition to fruitgrowing that should find a place upon the irrigated lands, and that the Government should assist settlers by testing the possibilities of fodders, new plants, cereals, and possibly new fruits. It was decided to inform the Branch that the Board had already recommended the Government to take steps in the direction of establishing a farm for the purpose of conducting the tests referred to.

### STOCK TRUCKING YARDS AT MELROSE.

The Board decided to urge the Minister of Agriculture to secure stock trucking yards at Melrose.

### NEW MEMBERS.

The Branch at Stirling's Well was closed, and the following names were added to the rolls of existing Branches:—Northfield—E. L. Canole; Salt Creek—P. Gale; Yallunda—F. E. B. Daniel, E. E. Blake, E. V. Fitzgerald; Inman Valley—John Stone; Ki-Ki—M. J. Young, C. R. Cooley, W. Bone, A. Morris, H. Porter, sen., H. Porter, jun., S. H. Hailes; Naracoorte—C. F. W. Staude, T. Munn; Cummins—Albert Fuss, O. A. Hall, R. H. Siviour, B. C. Black, Wm. B. Walkom; Wirrabara—S. Coad, E. E. Bairstowe; Lone Pine—H. Hoffmann; Northfield—James Neely; Brentwood—J. V. Davey, C. H. Launer; Pompoota—E. C. Hansford, L. A. King, H. Labiam, J. Carroll, J. J. Carson, C. E. Hill, A. E. Betts, G. Jolly, A. A. Verran, A. Woodhouse; Narridy—W. F. Nicholls; Murray Bridge—Robertson, — Reynolds, H. Filsell, C. G. Gudge, J. Rowan, A. Wells, J. T. Green; Berri—Chas. Garner.

* * *

# THE AGRICULTURAL OUTLOOK.

## REPORT FOR MONTH OF APRIL.

The following reports on the general agricultural condition and outlook of the areas represented by the Government Experimental farms mentioned below have been prepared by the respective managers:—

*Booborowie.*—Weather—With the exception of a few light showers during the early part of the month, the weather has been dry. The latter part of the month was unseasonable, and a good rain was needed that farmers might cultivate their land. Crops—Sowing has not been started, the ground being in poor condition for seeding. Natural Feed—The early grass has suffered a check due to the dryness of the month. Stock—Many deaths have occurred amongst horse stock, due to colic, caused by eating paddy melons. Pests—Mice are doing great damage in stacks of wheat and hay, and also by eating the plants in the gardens. Miscellaneous—As a result of the wet winter of last year and the cool summer the springs in the creeks have been very strong.

*Eyre's Peninsula.*—Weather has been cool with scattered very light showers, 40 points rain being registered for the month, rather less than the average for the past three years, viz., 62 points. Crops—Preparations for seeding have been general. The comparatively calm weather has greatly hindered burning operations. A small area has been sown in the district, but the majority are awaiting a good fall of rain. Natural Feed—Self-sown and natural feed are plentiful, and consequently have checked the burning of stubbles. Pests—Mice are plentiful, and playing havoc with the haystacks and seed wheat of the district. Rabbits are fairly plentiful.

*Kybybolite.*—Weather—Extremely cold in the early part of the month, but mild after, only light showers of rain have fallen. Crops—Seeding is more or less retarded by the dry weather; oats have been sown in many instances, but no wheat. Fodder crops are giving good late growth. Blight has developed on the kale plants, destroying a considerable amount of growth; it has never been known to kill kale, the crop always making a quick recovery after the rains. Natural Feed—The new growth has made very little advance on last month; there is an abundance everywhere. Stock are in very good order; the weather is favorable to the early lambs. Pests—Foxes are much more numerous than usual, and serious trouble is expected during the lambing season.

*Turretfield.*—Weather conditions during April were generally fine with some cold nights. The rainfall was 74 points, of which the greater part fell in the early part of the month. Further falls are now being eagerly looked forward to. Crops.—Farmers have not started seeding to any great extent. They are waiting for rain for two reasons. Firstly to secure immediate germination, and secondly in the hope that a good rain will kill a large number of the mice which infest the fields. Natural feed is going off considerably, the grass having a decided yellow tint. Stock have improved in condition since last month. Some sheep have been lost in the district. The Government Veterinary Surgeon (Mr. F. E. Place) conducted a post-mortem examination in several cases and found the cause of death to be sarcosporidious (blood cell parasites). Pests—Starlings have not been so much in evidence during the month of March, presumably owing to the closing of the fruit season. But all other pests pale into insignificance when compared with the mice plague. These rodents are doing very considerable damage in the barns and elsewhere.

*Veitch.*—Weather—Rainfall for month, 24 points; Veitch average for same month, 28 points. Weather conditions have been suitable for cultivation. Natural Feed—Both stubble and scrub feed are showing up well. Stock—All in healthy condition. Pests—Mice are doing a lot of damage. Miscellaneous—Seeding operations are now going ahead on a good many farms in the district. Wheat is still being carted into the Veitch siding.

## RAINFALL TABLE.

The following figures, from data supplied by the Commonwealth Meteorological Department, show the rainfall at the subjoined stations for the month of and to the end of April, 1917, also the average precipitation to the end of April, and the average annual rainfall.

| Station. | For April, 1917. | To end April, 1917. | Av'ge. to end April | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| **FAR NORTH AND UPPER NORTH.** | | | | |
| Oodnadatta | — | 3·28 | 2·16 | 4·76 |
| Tarcoola | 0·13 | 4·32 | 1·54 | 7·58 |
| Hergott | 0·03 | 2·47 | 1·91 | 6·04 |
| Farina | — | 2·95 | 2·16 | 6·70 |
| Leigh's Creek | — | 4·86 | 2·49 | 8·66 |
| Beltana | — | 5·48 | 2·75 | 9·22 |
| Blinman | — | 3·94 | 3·50 | 12·83 |
| Hookina | — | 8·03 | 1·67 | — |
| Hawker | — | 7·65 | 2·42 | 12·22 |
| Wilson | — | 5·26 | 2·59 | 11·78 |
| Gordon | — | 7·57 | 1·97 | 10·26 |
| Quorn | — | 4·97 | 2·61 | 13·78 |
| Port Augusta | — | 3·18 | 2·51 | 9·46 |
| Port Augusta W. | — | 3·50 | 2·17 | 9·36 |
| Bruce | 0·04 | 4·80 | 1·93 | 10·01 |
| Hammond | 0·06 | 7·39 | 2·61 | 11·46 |
| Wilmington | 0·13 | 5·12 | 3·54 | 18·26 |
| Willowie | 0·09 | 6·09 | 2·35 | 11·90 |
| Melrose | 0·34 | 6·86 | 4·81 | 23·04 |
| Booleroo Centre | 0·12 | 5·97 | 3·16 | 15·83 |
| Port Germein | 0·10 | 4·15 | 2·96 | 12·84 |
| Wirrabara | 0·16 | 5·55 | 3·75 | 18·91 |
| Appila | 0·16 | 5·36 | 3·39 | 15·08 |
| Cradock | — | 6·14 | 2·37 | 10·86 |
| Carrieton | 0·05 | 7·15 | 2·51 | 12·22 |
| Johnburg | 0·01 | 5·69 | 2·04 | 10·21 |
| Eurelia | — | 6·95 | 2·72 | 13·24 |
| Orroroo | 0·02 | 6·49 | 3·17 | 13·42 |
| Black Rock | 0·03 | 6·25 | 2·86 | 12·25 |
| Petersburg | 0·13 | 7·07 | 3·04 | 13·07 |
| Yongala | 0·13 | 6·80 | 2·89 | 13·94 |
| **NORTH-EAST.** | | | | |
| Ucolta | — | 6·14 | 0·95 | — |
| Nackara | — | 6·95 | 1·42 | — |
| Yunta | — | 6·58 | 2·19 | 8·22 |
| Waukaringa | — | 5·74 | 2·01 | 7·94 |
| Mannahill | — | 4·58 | 2·30 | 8·46 |
| Cockburn | — | 6·12 | 2·24 | 7·97 |
| Broken Hill, NSW | — | 7·34 | 2·72 | 9·63 |
| **LOWER NORTH.** | | | | |
| Port Pirie | 0·08 | 4·98 | 3·11 | 13·21 |
| Port Broughton | 0·20 | 3·05 | 3·18 | 14·33 |
| Bute | 0·08 | 3·66 | 3·20 | 15·42 |
| Laura | 0·38 | 5·02 | 3·69 | 18·22 |
| Caltowie | 0·33 | 4·61 | 3·51 | 17·27 |
| Jamestown | 0·19 | 4·44 | 3·43 | 17·46 |
| Gladstone | 0·42 | 4·82 | 3·33 | 16·00 |
| Crystal Brook | 0·35 | 4·42 | 3·25 | 15·62 |
| Georgetown | 0·28 | 5·26 | 3·78 | 18·32 |
| Narridy | 0·22 | 4·63 | 3·46 | 16·79 |
| Redhill | 0·09 | 4·43 | 3·38 | 16·79 |
| Spalding | 0·18 | 3·36 | 3·21 | 20·25 |
| **LOWER NORTH—*continued*.** | | | | |
| Gulnare | 0·42 | 4·53 | 2·90 | 19·74 |
| Bundaleer W. Wks. | 0·36 | 3·59 | 2·89 | 17·29 |
| Yacka | 0·29 | 3·91 | 3·01 | 15·27 |
| Koolunga | 0·13 | 4·66 | 3·27 | 15·94 |
| Snowtown | 0·23 | 4·03 | 3·23 | 15·70 |
| Brinkworth | 0·11 | 4·34 | 2·78 | 15·48 |
| Blyth | 0·43 | 4·08 | 3·50 | 16·34 |
| Clare | 1·05 | 6·16 | 4·80 | 24·30 |
| Mintaro Central | 0·90 | 6·06 | 3·90 | 21·99 |
| Watervale | 1·75 | 7·50 | 5·32 | 27·17 |
| Auburn | 1·15 | 6·30 | 4·25 | 24·25 |
| Hoyleton | 0·61 | 4·58 | 3·84 | 17·96 |
| Balaklava | 0·41 | 3·91 | 3·58 | 16·03 |
| Port Wakefield | 0·40 | 5·02 | 3·42 | 13·13 |
| Terowie | — | 5·04 | 3·12 | 13·71 |
| Yarcowie | — | 5·71 | 3·09 | 13·91 |
| Hallett | 0·10 | 3·04 | 3·20 | 16·40 |
| Mount Bryan | 0·16 | 3·14 | 2·96 | 15·73 |
| Burra | 0·34 | 2·85 | 3·63 | 17·82 |
| Farrell's Flat | 0·45 | 3·03 | 3·79 | 18·87 |
| **WEST OF MURRAY RANGE.** | | | | |
| Manoora | 0·83 | 4·69 | 3·53 | 18·09 |
| Saddleworth | 0·85 | 4·40 | 4·28 | 19·69 |
| Marrabel | 0·72 | 3·83 | 3·96 | 18·94 |
| Riverton | 0·86 | 6·06 | 4·37 | 20·48 |
| Tarlee | 0·74 | 4·13 | 3·94 | 17·48 |
| Stockport | 0·66 | 3·45 | 3·64 | 15·89 |
| Hamley Bridge | 0·59 | 3·59 | 3·78 | 16·45 |
| Kapunda | 0·75 | 3·67 | 4·33 | 19·67 |
| Freeling | 0·92 | 3·55 | 3·99 | 17·85 |
| Greenock | 0·70 | 3·97 | 4·40 | 21·46 |
| Truro | 0·57 | 3·84 | 4·09 | 19·74 |
| Stockwell | 0·67 | 3·82 | 4·16 | 20·30 |
| Nuriootpa | 0·68 | 3·50 | 4·26 | 21·25 |
| Angaston | 1·16 | 4·59 | 4·41 | 22·25 |
| Tanunda | 0·87 | 3·79 | 4·61 | 22·28 |
| Lyndoch | 1·00 | 4·32 | 4·39 | 23·01 |
| Williamstown | 1·02 | 4·71 | 5·03 | — |
| **ADELAIDE PLAINS.** | | | | |
| Mallala | 0·53 | 3·91 | 3·71 | 16·88 |
| Roseworthy | 0·85 | 4·10 | 3·90 | 17·31 |
| Gawler | 1·06 | 5·07 | 4·16 | 19·21 |
| Two Wells | 0·40 | 3·48 | 3·62 | 16·36 |
| Virginia | 0·84 | 4·87 | 3·81 | 17·58 |
| Smithfield | 0·90 | 5·15 | 3·56 | 17·30 |
| Salisbury | 0·78 | 5·19 | 4·11 | 18·57 |
| North Adelaide | 0·80 | 7·31 | 4·37 | 21·49 |
| Adelaide | 0·68 | 6·02 | 4·25 | 21·04 |
| Brighton | 1·04 | 7·13 | 4·03 | — |
| Glenelg | 0·62 | 5·80 | 3·88 | — |
| Magill | 1·08 | 7·14 | 5·13 | 19·93 |
| Glen Osmond | 1·26 | 7·65 | 5·01 | 25·26 |
| Mitcham | 0·97 | 7·00 | 4·59 | 23·47 |
| Belair | 1·39 | 7·93 | 5·59 | 28·64 |

## RAINFALL—*continued.*

| Station. | For April, 1917. | To end April, 1917. | Av'ge. to end April. | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| MOUNT LOFTY RANGES. | | | | |
| Teatree Gully | 1·83 | 6·89 | 5·49 | 28·19 |
| Stirling West | 1·99 | 11·33 | 8·48 | 46·70 |
| Uraidla | 2·55 | 11·01 | 8·08 | 44·35 |
| Clarendon | 1·40 | 8·38 | 6·55 | 33·67 |
| Morphett Vale | 1·17 | 6·45 | 4·79 | 23·32 |
| Noarlunga | 0·71 | 6·51 | 3·99 | 20·28 |
| Willunga | 1·78 | 8·16 | 4·80 | 25·98 |
| Aldinga | 1·06 | 7·27 | 4·02 | 20·34 |
| Normanville | 0·54 | 5·74 | 3 95 | 20·65 |
| Yankalilla | 0·77 | 6·41 | 4·53 | 22·78 |
| Cape Jervis | 0·60 | 4·50 | 2·95 | 16·34 |
| Mount Pleasant | 0·91 | 4·68 | 4·98 | 26·87 |
| Blumberg | 1·20 | 5·99 | 5·39 | 29·38 |
| Gumeracha | 1·57 | 7·71 | 5·18 | 33·30 |
| Lobethal | 1·98 | 7·43 | 5·97 | 35·38 |
| Woodside | 0·97 | 6·96 | 5·44 | 31·87 |
| Hahndorf | 1·22 | 6·41 | 6·07 | 35·45 |
| Nairne | 1·13 | 6·42 | 5·62 | 28·83 |
| Mount Barker | 1·70 | 8·40 | 5·65 | 30·93 |
| Echunga | 1·62 | 8·26 | 6·18 | 32·83 |
| Macclesfield | 1·90 | 7·64 | 5·80 | 30·72 |
| Meadows | 2·17 | 8·65 | 6·85 | 35·52 |
| Strathalbyn | 1·03 | 4·72 | 3·98 | 19·28 |
| Myponga | 1·27 | 7·88 | — | — |
| Millbrook Reservr. | 1·77 | 7·45 | — | — |
| MURRAY FLATS AND VALLEY. | | | | |
| Wellington | 1·00 | 3·98 | 3·60 | 15·01 |
| Milang | 0·93 | 3·35 | 3·50 | 16·08 |
| Langhorne's Brdg | 1·09 | 3·88 | 3·30 | 15·27 |
| Tailem Bend | 0·84 | 5·37 | 3·11 | — |
| Murray Bridge | 0·85 | 3·43 | 3·46 | 14·32 |
| Callington | 0·75 | 4·24 | 3·50 | 15·65 |
| Mannum | 0·32 | 2·39 | 3·01 | 11·67 |
| Palmer | 0·53 | 2·52 | 3·30 | 15·60 |
| Sedan | 0·13 | 3·54 | 2·76 | 11·92 |
| Blanchetown | 0·09 | 1·06 | 2·72 | — |
| Eudunda | 0·55 | 2·69 | 3·61 | 10·71 |
| Sutherlands | 0·08 | 1·58 | 1·99 | 17·33 |
| Morgan | 0·01 | 1·47 | 2·19 | 10·60 |
| Overland Corner | 0·03 | 3·38 | 2·93 | 11·42 |
| Renmark | 0·15 | 4·81 | 2·56 | 10·93 |
| Loxton | 0·21 | 6·29 | 1·83 | — |
| Swan Reach | 0·04 | 2·33 | 2·38 | — |
| Waikerie | 0·04 | 2·59 | 2·19 | 9·29 |
| WEST OF SPENCER'S GULF. | | | | |
| Eucla | 1·60 | 3·67 | 3·24 | 10·13 |
| White Well | 0·90 | 3·36 | 2·00 | 9·67 |
| Fowler's Bay | 0·44 | 2·67 | 2·26 | 12·11 |
| Penong | 0·45 | 2·91 | 2·56 | 11·93 |
| Murat Bay | 0·20 | 3·06 | 1·70 | — |
| Smoky Bay | 0·15 | 2·31 | — | — |
| Streaky Bay | 0·59 | 3·08 | 2·63 | 15·31 |
| Port Elliston | 0·39 | 3·59 | 2·49 | 16 49 |
| Port Lincoln | 0·39 | 3·43 | 3·56 | 19·88 |
| WEST OF SPENCER'S GULF—*continued.* | | | | |
| Tumby Bay | 0·18 | 3·80 | 2·77 | 15·00 |
| Carrow | 0·29 | 6·14 | — | — |
| Cowell | 0·22 | 4·07 | 3·09 | 11·76 |
| Point Lowly | 0·02 | 4·19 | 2·66 | 12·21 |
| Cummins | 0·16 | 3·44 | — | — |
| Arno Bay | 0·32 | 4·06 | 2·82 | — |
| YORKE'S PENINSULA. | | | | |
| Wallaroo | 0·36 | 3·30 | 3·17 | 14·05 |
| Kadina | 0·29 | 3·24 | 3·46 | 15·88 |
| Moonta | 0·32 | 4·53 | 3·48 | 15·22 |
| Green's Plains | 0·35 | 3·55 | 3·10 | 15·73 |
| Maitland | 1·08 | 5·83 | 3·95 | 20·08 |
| Ardrossan | 0·48 | 3·81 | 2·96 | 13·89 |
| Port Victoria | 0·70 | 5·62 | 3·09 | 15·21 |
| Curramulka | 0·49 | 6·45 | 3·54 | 18·50 |
| Minlaton | 0·35 | 5·60 | 3·33 | 17·41 |
| Stansbury | 0·60 | 6·51 | 3·34 | 17·06 |
| Warooka | 0·35 | 6·26 | 3·03 | 17·71 |
| Yorketown | 0·30 | 4·85 | 3·18 | 17·47 |
| Edithburgh | 0·52 | 4·94 | 3·39 | 16·48 |
| SOUTH AND SOUTH-EAST. | | | | |
| Cape Borda | 0·70 | 3·67 | 4·19 | 25·09 |
| Kingscote | 0·44 | 5·66 | 3·24 | 18·95 |
| Penneshaw | 0·75 | 4·40 | 3·87 | 21·34 |
| Cape Willoughby | 0·83 | 4·19 | 3·71 | 19·69 |
| Victor Harbor | 0·92 | 6·22 | 4·32 | 22·18 |
| Port Elliot | 0·97 | 5·67 | 4·11 | 20·33 |
| Goolwa | 1·26 | 5·40 | 3·80 | 17·93 |
| Pinnaroo | 0·32 | 2·47 | 3·25 | 16·74 |
| Parilla | 0·50 | 2·59 | — | — |
| Lameroo | 0·61 | 2·67 | 3·33 | 16·55 |
| Parrakie | 0·75 | 3·24 | 2·54 | — |
| Geranium | 0·97 | 3·76 | 2·21 | — |
| Peake | 1·23 | 4·59 | 3·43 | — |
| Cooke's Plains | 1·29 | 5·72 | 3·21 | 14·74 |
| Meningie | 1·16 | 5·43 | 3·78 | — |
| Coonalpyn | 1·41 | 5·35 | 3·61 | 17·49 |
| Coomandook | 1·42 | 5·36 | 3·18 | 16·80 |
| Tintinara | 1·13 | 4·41 | 3·75 | 18·78 |
| Keith | 0·90 | 4·85 | 3·43 | — |
| Bordertown | 0·76 | 5·10 | 3·91 | 19·76 |
| Wolseley | 0·80 | 3·83 | 3·57 | 17·72 |
| Frances | 0·72 | 4·04 | 3·90 | 20·74 |
| Naracoorte | 1·03 | 4·72 | 4·41 | 22·60 |
| Penola | 1·16 | 5·02 | 5·17 | 26·78 |
| Lucindale | 0·93 | 3·49 | 4·29 | 23·32 |
| Kingston | 1·45 | 4·32 | 4·48 | 24·73 |
| Robe | 0·94 | 3·82 | 4·41 | 24·69 |
| Beachport | 1·09 | 5·04 | 5·16 | 27·51 |
| Millicent | 1·54 | 4·60 | 5·82 | 29·25 |
| Mount Gambier | 2·68 | 6·47 | 6·50 | 32·00 |
| C. Nrthumberland | 2·02 | 4·74 | 5·16 | 26·63 |
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| Bute | * | — | — |
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| Mintaro | 824 | 5 | 2 | Redhill | * | 1 | — |
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*No report received during the month of March. † Formal report only received.
‡ Held over until next month. § In recess until termination of war.

# ADVISORY BOARD OF AGRICULTURE.

## Date of Meeting—June 13th, 1917.

# THE AGRICULTURAL BUREAU OF SOUTH AUSTRALIA

Every producer should be a member of the Agricultural Bureau. A postcard to the Department of Agriculture will bring information as to the name and address of the secretary of the nearest Branch.

If the nearest Branch is too far from the reader's home, the opportunity occurs to form a new one. Write to the department for fuller particulars concerning the work of this institution.

## REPORTS OF BUREAU MEETINGS.

### UPPER-NORTH DISTRICT.

### (PETERSBURG AND NORTHWARD)

### MORCHARD (Average annual rainfall, 11in. to 12in.).

March 9th.—Present: 12 members and two visitors.

Harvester v. Stripper.—Mr. H. Brown read a paper in which he discussed the relative merits of the harvester and stripper, and declared emphatically for the former. With the stripper it was necessary to dump the wheat in a heap and then clean it, either with hand or motor power. The stripper saved a certain amount of wheat, but that was practically neutralised by the damage from rain before the wheat could be cleaned and bagged. The harvester possessed the great advantage of taking off the crop and cleaning it with the same motion ready for the bags. All that remained to be done, before marketing, was to sew the bags and cart them. That meant a considerable saving of expense. If the straw were cut and chaffed and a small portion of bran added it would make better feed than cocky chaff. Mr. Riechstein said that the harvester had helped the farmer considerably during the present wet season. Mr. Longbotham advised using the binder as well as the harvester. Mr. Jasper considered that the complete harvester had many advantages in wet harvests because bags of wheat were more easily protected than wheat heaps. Mr. W. Twigden declared that the complete harvester should never be used in the North. The stripper had the advantage of saving all the cocky chaff, and did not scatter so many wild turnip and charlock seeds. Mr. Gregory said that if the Northern farmers made no other provision for fodder, as a standby, they should save all the cocky chaff. Mr. Kitto was of opinion that the cost of taking off the crop by stripper and winnower was greater than by the complete harvester. If cut with the binder work could be commenced from six to 10 days earlier than with the harvester. Mr. Case pointed out that the harvester was a greater labor saver than any other harvesting method, but care should be taken to store up some straw.

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### WEPOWIE (Average annual rainfall, 13in. to 14in.).

April 14th.—Present: eight members and one visitor.

Qualifications of a Farmer.—In a paper on the qualifications of a farmer, Mr. P. Burns, jun., observed that the two principal features which should recommend farming to the young man were (1) its comparative certainty of success; and (2) the hopefulness of the future. The farmer required the ability to determine how to work the various classes of soil on his property, judgment in tillage, the use of fertilisers, and the selection of crops. Even poor land might produce profitable returns if cultivated according to the most suitable methods. There had been great progress of late years in labor-saving agricultural implements, and therefore the farmer required to make good use of his brain before becoming an expert in the use of them all. In dairying the farmer required sound judgment for the selection of stock and knowledge in the feeding and treatment of cows, pigs, and poultry. The farmer should be methodical, and should be industrious and attend to his own duties regularly. The avocation of a farmer required brains and intelligence, because he was stock he required some knowledge of the symptoms and treatment of common complaints to which they were subject, because at times it was difficult to obtain the assistance of a veterinary surgeon.

# MIDDLE-NORTH DISTRICT.

## (PETERSBURG TO FARRELL'S FLAT.)

### CRYSTAL BROOK (Average annual rainfall, 15.62in.).

April 10th.—Present: 20 members and two visitors.

Ensilage.—Ensilage, declared Mr. R. S. Booth in the outset of a paper on ensilage, had the advantages over hay that it preserved the foodstuff in a green and succulent form, and at the same time maintained its full weight as a green fodder in comparison with the weight which was dried out in the curing of hay. Under existing conditions the mass of natural herbage which was available in the spring was, under ordinary conditions, wasted (dried and blown away as with Cape weed, clover, &c.), or dried and became a harbor for vermin or a menace by providing fuel for bush fires. In ensilage that which was at present wasted could be cheaply and easily converted into profitable stock food, which once stored away was safe for practically all time if stored in properly prepared silos, or, at least for one year in the form which, under present circumstances he would advocate. He would specially recommend that that form of fodder be kept for the milking cows, because it was a proven fact that it increased the quantity and quality of the milk by, in some cases, 100 per cent., and was practically unexcelled as a summer, autumn, and early winter feed. During the past season he had observed acres and acres of feed up to 2ft. high, especially on the Broughton Flats—which, shortly after the advent of summer, had shrivelled and in most cases disappeared. Where it has not disappeared it was found to be a fine harbor for rabbits. A farmer excused himself from making ensilage because he only kept a few cows for his own use. But even so, was it not their bounden duty to get the best out of whatever they kept. In early spring they had plenty of butter and milk, and during that time supplied the town, but in winter they bought at exorbitant prices that which with a little foresight and labor they could produce at a quarter the cost, namely, by conserving the excess of natural herbage during spring. That could be done when other farm practices were not pressing. He did not intend to dilate on the growing of special crops for ensilage, his aim being to induce them to conserve that which Nature provided in abundance. The best time to cut was just when the herbage was flowering, in order to secure the maximum of feeding quality. The cutting should be done when the herbage was externally dry, that was, not immediately after rain or heavy dew. When cut it should be placed in the stack or silo as soon as possible. A good practice was to cut in the morning and stack in the afternoon, clearing up each day. Silos were of various kinds, but they could be grouped generally into the following:—(1) Underground type; (2) overground; (3) semi, half under and half above; (4) stacks. 1. Underground.—Those needed to be cemented, and also to have a movable roof, which could be pushed or lifted away when filling and emptying. He did not intend to dilate on that form of silo, or Nos. 2 and 3, reserving the full description of them until the farmer had tested and found the advantages to be gained by conserving fodder in the form of ensilage. However, one great advantage which a properly constructed silo had over other methods, was that the fodder could be chaffed before storing. The methods he would advocate—for a trial—on the ordinary farm, was that of stacking. In some cases an excavation was made, but he was not at all in favor of that, because should the silage not be all used before the winter set in it would stand a very great chance of being spoiled. He advised that the fodder be cut and stacked much in the same manner as loose hay. He preferred the mower, because it mixed the various grasses, &c., together better. Over each layer it was necessary to spread some salt, the amount depending on the size of the stack, but the ordinary run of farmers could judge the amount fairly accurately. This salt tended to preserve the fodder and also make it more appetising and beneficial to the stock. Before commencing the stack he advised the placing of a good foundation of say 1ft. of straw. When sufficient had been cut, carted, and stacked the top should be covered (the last layers being rounded off) liberally with straw, and wires placed over it with weights attached on each side (stones, old iron, logs, or anything handy sufficed for weights) at a sufficient height so that, as the stack settled they would not touch the ground. It was best to start with slight pressure and increase it gradually by attaching more weights. When opening for use at a later date it was well to do so in sections, taking each section through to the ground before commencing a new one. They would find that stock relished it. He had seen the practice he recommended carried out, and the ensilage was to all intents and purposes equal to that which he had seen come out of a first-class silo. The advantage of the latter over the stacks was, as he had said before, chaffing and keeping qualities. Ensilage, besides being an excellent fodder, tended to keep the stock in good health, because it retained all the qualities of the green feed. Members favored the stack system, though only two persons in the district made a practice of storing fodder in that manner.

MINTARO, March 10th.—Mr. D. Kelly led a discussion on the results of last season. He said that the season was an extraordinary one, and calculations should not be based entirely on its results. He referred to the seeding operations and fallowing, and also to the wonderful spring and the remarkably cool summer. He pointed out the bad condition of the fallow, and that it would be profitable to employ an extra team working the fallow during the spring and autumn to keep down the weeds. In regard to sowing, he said that it paid to sow thickly because the wheat stood up much better though it did not head so well, also 1½cwts. of super. per acre would do no harm. Mr. J. Thomas considered that 1cwt. of super. was sufficient. Mr. J. Pearer had as good a crop when he sowed 50lbs. as when he used 1½cwts. of super. Mr. S. Garrard considered that it was better to use 2cwts. of super. It was agreed that 1½bush. per acre was the right amount to sow. Mr. A. Sandow said that he got three more bags to the acre when he sowed with the land wet than when he sowed with it dry. Mr. Kelly advocated reaping in the morning when the wheat was a bit tough. For wheat he liked Crossbred 53 and Federation.

### WHYTE-YARCOWIE (Average annual rainfall, 13.91in.).

April 14th.—Present: eight members.

Wheat Growing and Stock Raising.—On a small farm, say under 1,000 acres, declared Mr. G. F. Jenkins, in a paper on wheat growing and stock raising, stock alone in that district was not profitable. Success was not possible without keeping keping sheep and properly cultivating the land, its carrying capacity would be greatly improved. The raising of sheep was a safe proposition because the prices of wool and meat were not likely to be materially reduced for some years. For breeding fat lambs for the market he preferred Crossbred ewes, though the fleece was not equal to the Merino. The greatest difficulty was in regard to the fences, but a six-wire fence was efficient in most cases, and those which got through it should be sent to the butcher. Crossbred ewes were quiet, good mothers. Selling lambs as suckers weighing from 36lbs. to 44lbs. was more profitable than keeping them for hoggets. Farmers should breed their own horses from their best mares. In that way they would not be as likely to get outlaws, as they would if they bought their horses. Mr. E. J. Pearce favored the Merino ewe because it was a much better sheep for the fences. The most difficult problems for the small farmer were the stocking of the farm and tiding the sheep over the dry months. Mr. Mudge preferred the Crossbred ewe because it was quieter than the Merino, and did not trample the feed about so much. Mr. Green preferred the Merino-Leicester cross, because of their breeding qualities and their good fleeces.

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MINTARO, April 7th.—Mr. T. J. Horgan delivered an address on the care and feeding of farm horses, which was generally agreed with.

MUNDOORA, April 9th.—In the course of a general discussion on various subjects Mr. Stephenson recommended farmers to have their soil analysed in order to ascertain what plant food materials they were deficient in with a view to supplying same.

## LOWER-NORTH DISTRICT.

### (ADELAIDE TO FARRELL'S FLAT.)

### NORTHFIELD (Average annual rainfall, 19in.).

April 3rd.—Present: seven members and two visitors.

New Zealand Flax and its Treatment.—New Zealand flax (*Phormium tenax*), remarked Mr. F. Chardon in a paper on New Zealand flax and its treatment, was native to New Zealand, but was also found distributed in other parts of Australasia. It has been introduced into several European countries, and was cultivated to quite an extent in North America. The chief difficulty had been to find a means of dressing the flax, and the New Zealand Government was offering a substantial bonus for an improved process of treatment. The fibre of New Zealand flax was very white in color, soft and flexible, and possessed a very high finish. The leaves of the plant reached over 6ft. in length, and under the present method of treatment the amount of fibre obtained was from 10 to 14 per cent. of the weight of the leaves, although the latter contained as much as 20 per cent. fibre. The fibre was principally used in the making of rope, twine, matting, &c., the best of it being woven into cloth. It was also largely used in America in connection with fibrous plaster work in which it played a very important part. The plant grew naturally in swampy soil, and it was only of late years that it had been found that flax repaid cultivation, and moreover, grew better and more firmly on good ground than on swamps. On sandy ground or near the sea, while the leaf did not grow to the height it attained on the swamp lands the fibre was tougher, and the plant generally of a more hardy nature. The plant grew in clumps, composed of fans, each fan containing from 10 to 12 blades or leaves. In gathering a man with a sickle hook was able to cut and tie from three to four tons per day. It was tied in bundles weighing about 1cwt. each, and then carted to the mill to be stripped. Stripping meant freeing the vegetation from the fibre, and was accomplished with a machine having angle beaters on a drum. The flax was fed into the stripper, two blades at a time, and passed between the drum (which had a necessary speed of 1,600 revolutions per minute) and a beating bar, thereby loosening the vegetation from the fibre. After passing through the machine it was separated into fair-sized hanks, then passed it on to a "shaker" who "cracked" each hank to free it from all loose vegetation. The next process was washing. After being thoroughly shaken it was put into a trough with running water. Each hank was hung on a peg and scraped. It was then carted to the paddocks and spread in rows to be bleached, and within a week or more, with fair weather, it was bleached white. A bonus had been offered for a process that would avoid the bleaching by paddocking, because the former was too uncertain, and with bad weather it had a tendency to weaken the fibre. When properly bleached it was brought in for its final treatment, an operation called "scutching." The "scutcher" was a large box-like machine, having wooden beaters revolving inside. The action of the "scutcher" thoroughly cleaned away all vegetation remaining, and gave the necessary finish to the commercial article. As the fibre was passed into the "scutcher" it was firmly held, and one end being done, it was then reversed. It was then baled ready for an ever-waiting, ever-growing and an ever-unsatisfied market. The grower could forward it, feeling confident of obtaining an excellent return and a certain profit. The short ends which the "scutcher" combed out were called "tow," and were used chiefly for the cheaper class of twines, bedding, &c. It had a commercial value of about £6 per ton. At present the price of New Zealand fibre for G.F.A. was about £37 per ton. When the amount and value of the fibre exported were considered it would be seen that the industry was very vital to New Zealand. For the year 1916, with limited freights and shortage of labor, 27,674 tons of flax, valued at £1,001,725, were produced. Mr. Neely, who has recently come from the North of Ireland, where he said the best flax in the world was grown, declared that the paper was most interesting, though everything connected with it seemed entirely different from the flax in Ireland.

### SALISBURY (Average annual rainfall, 18.57in.).

April 3rd.—Present: 13 members.

**Almond Growing.**—In a paper on almond growing Mr. A. G. Jenkins described many of the botanical characteristics of the tree, and referred to the range of its cultivation. The range of varieties of the almond, he said, was as wide as the scope of its cultivation. The oldest variety seemed to have been the bitter sort, which was still used in commerce, but gradually that had been toned down under the influence of environment, &c., until the sweet-kernelled variety made its appearance. The almond would do well on a variety of soils with 16in. rainfall or more—in fact, in almost all, except sour or swampy localities. The climatic conditions at flowering time seemed to affect the crop a good deal, and it would seem to be unwise to plant extensively in localities which were liable to very severe frosts. As a rule, when almond trees were planted, most people, knowing their reputation as hardy trees, simply made a hole big enough to cover the root system, and put them in. But it was as well, in order to secure the best results, if planting extensively, first to subsoil the land; or, if planting odd trees, to dig a hole 18in. square, and loosen to a depth of 15in. Before the tree was planted a shovelful or two of rotted manure or a handful of bone super. sprinkled in the hole would give the tree a better start, and secure better results than a tree stunted at the beginning. For the first three or four years it was needful to prune the young trees to make their natural spreading or upright habits conform to the ideas of the grower. After that a little thinning out occasionally would suffice. When the trees were planted in block formation it was desirable to plant from 20ft. to 30ft. apart, according to the richness of the soil. When planting in rows around the edges of paddocks 10ft. was about a fair distance. A good ploughing and harrowing in the early spring, when the soil was in good condition, was almost all that was necessary in the way of cultivation unless heavy rain should fall later, when cultivation might be beneficial. When trees were planted in rows as breaks ploughing out from the trees about June, and turning it back again about September usually provided a lasting tilth if the soil was in the right condition. He then dealt with the characteristics of different varieties, and stated that the weight of kernel compared to weight of shell in almost all the varieties mentioned was more than the Brandis and that of the Hatcho, Nonpariel, and an unnamed seedling, the highest. That in conjunction with the bearing qualities of the tree should be taken into consideration if the nuts were to be cracked for sale, but since nuts were mostly sold in the shell, the variety which returned the greatest weight of nuts per tree, providing the other qualities were up to standard, was the one to grow. From tests made in California on 10-acre blocks with I.X.L., Nonpariel, and Ne Plus Ultra over a period of three years, started when the trees were three years old, the Ne Plus Ultra was first, then Nonpariel and I.X.L., the yearly average being 8½lbs. per tree. That result might be altered slightly under the conditions in that district, and probably some of the local varieties would do as well or better. Anyone who contemplated almond growing should first ask himself the question does it pay? If 80 trees per acre were planted, it would be fair to assume, over a period of 10 years, that there would be a return of, say, 2lbs. per tree per year average, which would be absurdly low. That yield, at 6d. per lb., would return £4 per acre per year. That was for the first 10 years. Subsequently double that income should be received, and it should be increased as the trees further developed. Those returns should be obtained from very ordinary soils. As a profitable sideline almond growing should commend itself to most people on the land, and as a main item it was certainly not to be despised. In the discussion the opinion was general that almonds did not flourish in wet and low-lying places, and that whilst trees might be grown to advantage in what would otherwise be waste spaces as a breakwind the cost of the gathering would render it unprofitable as a main crop.

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FREELING, March 8th.—Mr. E. Morris propounded a scheme for establishing a co-operative horse-breeding society, consisting of 20 members, who would each subscribe £15 15s., yielding £315, which would be used to purchase a high-class stallion, whose services could be secured for the mares of members at £2 2s., whilst non-members paid £4 4s. Mr. Neldner said that the district was unsuitable for horse breeding on the lines indicated. It was finally resolved that Mr. Morris be asked to interview farmers in the district, and endeavor to secure a sufficient number of members to form a society.

LONE PINE, April 3rd.—Mr. J. G. Hoffmann read a paper on the handling of colts, in which he urged that a colt should not be handled until it was three years old, and that the operation should be conducted with great kindness to ensure the best results. The colt should be lassoed or put in a crush pen and then bridled. It should then be taken into the open and mouthed. Afterwards it should be harnessed singly to a log weighing about 1cwt. for a couple of rounds or more, and later on it might be tried doubly with a quiet horse, using the whip as sparingly as possible. The colt should always be spoken to in a strong, commanding voice. Mr. O. Lehmann considered that a colt could be handled when 2½ years old. It would take four weeks to break in a colt. Mr. Walter Schmaal advised the practice of tying up young colts when foals.

ROSENTHAL, April 4th.—Mr. S. C. Davis read an exhaustive paper on the bulk handling of wheat.

## YORKE PENINSULA DISTRICT.

### (TO BUTE.)

MOONTA (Average annual rainfall, 15.22in.).

April 14th.—Present: 14 members.

**Best Methods of Cultivation.**—In a paper discussing the best methods of cultivation, Mr. W. J. Brinkworth said that it was best to commence the summer fallowing as soon as the harvest was finished, but winter fallowing should be commenced as soon as seeding operations had been finished. The longer the soil was exposed to the influence of the sun and atmosphere the better chance there would be of a good crop. Fallowing operations frequently failed through late commencement, and afterwards by giving too little working, so that the soil was left rough and cloddy, and the rain absorbed by the clods quickly evaporated, instead of being retained for the use of the wheat plant. Fallowing with the cultivator had been done recently with very satisfactory results, because it left the ground fine instead of cloddy, thereby providing a better seed bed. He would not recommend cultivating red soil which set hard, but would rather plough it. He knew an instance of 30bush. per acre being reaped this season from cultivated fallow. All fallow should be well worked in order to provide a good seed bed before being sown. The soil should be well worked before drilling was commenced. The wheat should be drilled in about 2in. deep, a bushel to the acre, with say 80lbs. to 100lbs. of phosphate manure. Afterwards the land should be harrowed with a light set of harrows if the seed were not covered, to prevent the mice and birds from devouring it. Fallowing in a dry season should be started and worked down as soon as it was ploughed before the lumps or clods got dry. If it were over dry when it was ploughed a good plan was to roll it the same day, because that would crush it down and help to retain the moisture. As soon as a shower of rain fell the land should be harrowed. All fallow should be well worked to keep down all weeds and make a good seed bed. If no rain fell after fallow, as sometimes happened, sowing should be deferred until there had been rain, and the ground had been worked while wet, otherwise it would be too loose. Sandhills should be ploughed as soon as seeding had been finished and sown with oats or some other fodder which could be cut for feeding purposes, or it could be fed off. That would prevent drift. Mr. W. Edge said shallow fallowing was best in that district. It was a mistake to fallow too great an acreage. It would be more advisable to fallow a smaller area and work that area well. Mr. A. B. Ferguson observed that all country must be worked according to its nature. He favored summer ploughing because when the rain came it absorbed the moisture and made the soil nice and soft. He favored working fallow directly after harvest. It then retained the moisture better, and would yield fully a bag of wheat to the acre more. He also favored shallow ploughing because it kept away from the rubble bottom, but if the land were heavy clay it could be ploughed more deeply.

## WESTERN DISTRICT.

BUTLER (Average annual rainfall, 16.61in.).

April 10th.—Present: nine members.

**Pickling Wheat.**—In a paper dealing with the pickling of wheat Mr. A. H. Pfitzner observed that the first essential was the cleanliness of the seed. It should be free from all waste matters, including whiteheads, which had a far-reaching effect in producing the odd grains of smut so frequently found at harvest time. Although wheat appeared to have had a good soaking he had examined whiteheads closely, and found the chaff packed so closely around them that they had never received a touch of the pickle. That meant that the whitehead was sown without pickle, and the result was the odd grains of smut found in the crops. Pickle should not be less than 1lb. of bluestone to four gallons of water, or 1lb. of bluestone to every 6bush. of wheat. The pickling should take place long enough before sowing to enable the seed to dry, thus assuring an even flow through the drill. The consensus of opinion was that 1lb. of bluestone to 4galls. of water was much too strong, 1lb. to 10galls. being the correct amount. Mr. C. F. Jericho observed that as a grain of wheat had a certain amount of grease, luke-warm water would be more penetrating. Mr. P. Parker said that he added one pint of salt to his pickle of 1lb. of bluestone and 10galls. of water. Mr. R. Barr, jun., mentioned a system of dry pickling.

SEED WHEAT.—Dealing with the question of seed wheat, Mr. J. Owen, in a paper, said that after the proper preparation of the soil the seed was the next essential circumstance, and the variety of wheat most suitable to the district was the first consideration. Each farmer had a "pet" wheat, or one or two varieties which he found gave the best results over a number of years. How to make the best yielders better was the next thing, and that could be accomplished by selection—that was, by going through the best portions of the crop and picking the heads of the best-looking plants. Great care should be taken in selecting only ripe heads. It would be necessary to secure about 14lbs. of grain, which should be winnowed by hand and cleaned thoroughly. The seed so gathered should be sown broadcast in a ¼-acre plot of good clean well-worked land with a good dressing of, say, 60lbs. super. When that crop was ready to reap it should be gone through, and another 14lbs. of the best heads selected as seed for the next year's plot. If that operation were continued for a few years the wheat from the plot would be found to be far superior to that first planted. The wheat reaped from the plot could be used for seed to sow in the paddocks. All grain intended for seed should be thoroughly ripe before being harvested. It should not be allowed to remain on the damp ground, but should be stored in a dry, well-ventilated barn; otherwise weevils might cause trouble. It should be cleaned thoroughly and graded in order to remove all small and cracked grains; also all foreign seeds, such as charlock, &c. Having got good clean healthy seed, the next thing was to pickle it with a view to protecting the crop from bunt or smut. Various substances could be used for pickling, such as lime and salt, sulphate of soda, copper sulphate, formalin, carbolic acid, &c., but the best and most widely used was copper sulphate, or bluestone. There were various methods of pickling with bluestone adopted, each method having many supporters, but the method he favored was a solution of 1lb. of bluestone and 10galls. of water in a wooden barrel. When wheat was sown under dry conditions of soil it was best not to pickle. If the seed was pickled there was danger of malting. It was always advisable to clean one variety of wheat from the drill before putting another variety into the box if it were intended to obtain next year's seed from that crop. Mr. Barr said that he preferred bran bags to super. bags for use in pickling. Some members considered that pickled wheat was less liable to malt than dry seed.

### KOPPIO (Average annual rainfall, 22.40in.).

April 3rd.—Present: seven members.

INCREASING THE STOCK CARRYING CAPACITY OF THE HOLDING.—Under this heading Mr. G. B. Gardner read a paper in which he expressed the opinion that clear land, which was bearing good natural grass, could be used as pasture instead of being broken up and that those portions covered with scrub and undergrowth should be cleared and cropped, especially as much of it was fairly good agricultural land, capable of carrying stock. The gum country, which was good strong land, would return a good profit if cleared. In clearing he recommended barking the trees from the ground, a distance of 18in. up the butt, which was more successful than girdling, because the latter operation always induced new growth below the girdle, causing considerable trouble to remove. A tree which had been barked took a year to die, but that was the end of it. There was a large area of land in that district which, if treated in that way, could be converted into excellent grazing land, and double the stock-carrying capacity of the district. Members agreed with the writer's view of barking gum trees. Land on which the gum trees had been rung came into grass much more quickly if the bark and rubbish were left upon it unburned. Mr. R. F. Richardson recommended the conservation of the sheoak trees, which were dying out. They were the only edible trees for stock they had.

### MILTALIE (Average annual rainfall, 14.55in.).

March 3rd.—Present: nine members and two visitors.

SAVING ODDS AND ENDS.—A paper was read by Mr. H. R. Jacobs on the saving of odds and ends on the farm. He pointed out that, owing to the increased cost of all farming material, the strictest economy was essential. When bolts and parts of machinery were broken they should not be thrown away. The nut and washer should be hung on a wire, and would become useful sooner or later. By the use of a stock and die a new thread could be put on the bolt. Pieces of chain, leather, timber, nails, iron, and hoop iron, &c., should also be saved. In connection with the bag lifter, hoop iron was a capital thing to use in place of the chain, being strong, and much easier to run the truck over. Hoop iron was also being used in place of chain for general work. Those who used it contended that it did not rub the horse's sides so much as chains. If cornsacks were left lying about mice would render them useless, or, if exposed to the sun and rain they would soon rot. Seed wheat bags should, when emptied, be turned inside out, well shaken, then bagged up, tied, and hung in a dry shed by a piece of wire at least 2ft. from the ceiling. Care should be taken not to mix them with the super. bags. If super. bags were washed when emptied they could be used for some purposes, but the use hardly repaid the time and trouble of washing. Mr. D. Bagnell considered that time was one of the odds and ends which should be made the best use of. Great care should be taken of bags. They should not be left lying about to spoil. Mr. W. E. Kier believed in saving broken bolts. He was averse to using hoop iron for mending harness, but it might be used in place of chain on the bag lifter. Mr. E. Story advocated the care of nails as well as bolts. Mr. L. Aungur would not lose time in saving bolts and nails, but would use hoop iron.

### MILTALIE (Average annual rainfall, 14.55in.).

April 7th.—Present: 11 members and one visitor.

Seeding Operations.—Owing to the increased cost of production, remarked Mr. Lionel J. Aunger, in a paper on seeding operations, combined with the difficulties of disposing of produce, it was essential that seeding operations should be conducted on the most economical lines in order to realise a profit. By working on economical lines he did not mean drilling the seed into the ground without the necessary cultivation, in order to get a large acreage cropped. The principal consideration was the preparation of the seed bed. Every success or failure which appeared throughout the district during harvest time was invariably an argument in favor of good cultivation. As a rule the preparation of the soil was not commenced far enough ahead of seeding time. Even on comparatively new land it was advisable to fallow, and when the farm became older they could not expect a good crop without it. When fallowing advantage should be taken of every rain and as much of the land as possible worked over before it became too hard. He did not favor deep ploughing. On the lighter soils the best were right on top, and would not grow a good crop if the lower poor soil was turned up. The better soil, which had a greater depth, was heavier, and to plough that deeply was expensive and too slow. Their limited rainfall compelled them to finish ploughing quickly, and harrow or cultivate the soil before it became dry. If the second growth of weeds was not too great the mouldboards should be taken off the twin plough, and it was equal to an excellent cultivator. Where the surface soil was becoming worked out it was advisable to work more deeply occasionally, because although the immediate returns were lessened eventually a benefit would be derived. As few stumps as possible should be pulled out at seeding time, and the draught should be put on for fallowing. New land should be sown early with a wheat that would stand up well, such as Yandilla King or German Wonder. Late wheats should be sown early, and early wheats late. Oats should be sown before wheat, and barley, if for grain, last. The most should be made of the good land. It was inadvisable to sow a crop among stones and bushes if good land were idle. On good clean fallow it would be profitable to put not less than 1cwt. of super. and 1bush. wheat. Seed wheat should be free from barley, oats, drake, and smut. When pickling seed two bags of wheat should be made into three lots, and each dipped into a cask of bluestone solution—not less than ½lb., and not more than 1lb. of bluestone to 10galls. water. The wheat when dipped should be drained on a sheet of galvanized iron arranged so that the solution should run back into the barrel. The cask should be sunk halfway in the ground in order that a man might stand over the cask and lift the wheat out easily. They could not expect to farm successfully without sheep. Only those farmers who had no sheep knew how difficult it was to keep fallow clean without them. It was unfortunate that so many wheatgrowers were not in a position to leave land out for grazing instead of cropping with wheat until takeall ruined it for years. The quickest way to get rid of takeall was to burn stubble, fallow early, kill all weeds, only work the land wet, cultivate as shallow as possible in order to leave the land firm, stock heavily to enrich the soil, kill weeds, make surface drift, and use more super. If the land were sandy and thistles grew well on it oats should be sown at the rate of 1bush. to the acre with super. If the oat stubble were burned the land could be either left out for feed, a self-sown crop, or fallow. A few oats on fallow did little harm if they were not allowed to seed. Wheat should not be sown before the rains came. It was better to be late with the seeding than to sow dry. Mr. W. G. Smith endorsed the suggestion for a heavy dressing of manure on the stiff soils in that district. Mr. P. J. McEachen did not agree with the suggestions as to pickling wheat. Mr. J. S. Jacobs was averse to using a cask for pickling wheat. Mr. T. J. P. McEachen favored the light working, because it was less expensive and less strain on the team. He did not favor the heavy dressing of super. Mr. J. P. Story would not always give a heavy dressing of super. He had used a cask for pickling wheat, but was not quite sure that it was the best method. Mr. H. R. Jacobs said that if the land to be cropped were fallowed the heavy work at seeding time was lessened. He advocated the use of large implements because they saved labor, and he believed in getting the crop in as early as possible. Mr. W. E. Hier said that it would pay to use plenty of manure.

## MINNIPA.

February 10th.—Present: nine members and two visitors.

The Cross Breeding of Fowls.—There were 95 different breeds of fowls, observed Mr. C. H. Cooke in a paper on the cross breeding of fowls, and, he continued, some were noted for their superior quality as table birds, and others for their laying capacity. The Leghorn was first class as a laying fowl, but not a good table bird. A cross of the White Leghorn and Orpington produced a good table bird and a very fair layer. Another cross was the Rhode Island Red and the Leghorn, which gave fine table birds and was also a profitable laying strain. The Rhode Island Red was an American breed, large in size, very dark buff color, with yellow legs, and a valuable all-round breed. The Orpington was an English composite breed, and one of the most popular of the day as a good all-round fowl for the farms. They were very good layers and made a good cross with the White Leghorn. They were fowls that did not fly on haystacks or scratch about the yards like many other light breeds, and therefore they were not so destructive as the barndoor breeds. Another cross for table birds only was the Indian Game (a huge-boned member of the Game family; very heavy, and a fair layer) with the Dorkings or Orpingtons. The cross produced table chickens, good sitters, and excellent nurses. Another cross was the White Leghorn with the Black Minorca, the resulting product being a good laying bird and very hardy. The Minorcas were one of the best breeds of domestic poultry.

## MINNIPA.

April 7th.—Present: 11 members and three visitors.

The Seeding of Wheat.—To produce the best results in wheat growing, remarked Mr. L. J. Cook in a paper on the seeding of wheat, it was essential that strict attention be paid to the seeding of the grain, and, where possible, only proved methods and practices should be adopted. Reports were often heard of farmers obtaining splendid yields, and sometimes exceptional ones, from crops which had been seeded without practically any care or thoroughness, but it would invariably be found that it was the farmer who adopted proved methods, and performed them thoroughly who would produce the greatest results over a decade of seasons. Firstly the principal function in the seeding of wheat was the preparation of the soil for the reception of the grain. The wheat plant was one of the most hardy plants to grow, and could be successfully produced under widely varying climates, but like all other farm and garden plants, to obtain maximum results it was necessary to prepare a good seed bed. With the climate with which the greater part of South Australia was favored the widely adopted practice of bare fallowing lent itself admirably to the formation of an ideal wheat seed bed, viz., a firm, well subpacked soil, with 2in. to 3in. of loose crumbly soil on the surface. Theoretically explained, that condition was to provide an evenly distributed, freely accessible, and available supply of plant food for the use of the roots of the wheat plant, and to provide a medium in which the roots could secure a firm hold and be enabled to help the plant better to withstand adverse outside influences. The land was ploughed up to an even and as great a depth as economically possible to allow air, warmth, moisture, and carbonic acid gas to penetrate into the soil, and so act upon the soil constituents and prepare them into available forms for the plant to use as food. Thereafter, with the various workings, the aim was to consolidate the under layers and avoid leaving loose open spaces beneath the growing plant, because they were very detrimental to its health. When the soil had been nicely consolidated evenly throughout the moisture containing the plants food could move more readily through it by capillarity, and when the soil was close around the roots they could find their food close at hand, whereas, with an open soil, the moisture had difficulty in rising and permeating it, and it was impossible to have an even distribution of the plant food and moisture. The advantage of maintaining a good sturdy and continuous growth would be appreciated, hence the advisability of preparing the soil so that it would not check the root growth, which must affect the health of the plant. With regard to the depth of ploughing, wheat was a deep-rooting cereal, and therefore necessarily required deep ploughing, and, where early fallowing was practised, the land could be safely turned to a good depth, the late winter and spring rains being sufficient to consolidate the under layers. Where, however, late fallowing was availed of, or where new land was being cropped, it was necessary, if deep ploughing were adopted, to consolidate the under layers artificially by means of a good heavy roller. That operation was expensive, especially since it might probably require the roller to be put over the land a number of times to secure the desired effect. Therefore, in sowing new land in particular it was generally advisable to plough shallowly 2in. or 3in. a month or six weeks at least ahead of the drill. By so doing the aim was to sweeten the surface inches, but at the same time that practice tended to make the crop comparatively shallow rooted. In country such as in that district where scrub fires did not have an even effect over the soil, it was advantageous to stir the ploughed surface again with a scarifier, harrows, or cultivator prior to drilling. With regard to the actual depth of ploughing when fallowing early, as yet sufficient data was not available to enable a reliable result to be quoted. The matter was being tested at Roseworthy, and during the last few years, the results showed a gradual increase in yield from the most shallow ploughing (2in.), to the deepest ploughing (12in.), but the increase had not been sufficiently great to warrant the expense of very deep ploughing. However, when the test had been carried over a greater number of seasons, it was quite expected that at any rate an occasional deep ploughing would be amply repaid. In that district, with the initial fallowing, it was advisable to plough 4in., and then gradually extend the depth of fertility with each successive fallowing. In dealing with the working of fallowed land, time would not permit of detail in that paper, but such working should always aim to maintain the surface soil in a crumbly, not powdery, condition and free from weeds, as well as to secure a consolidated under surface. It should always be remembered that even ploughing, even cultivation, and even drilling meant a more even crop, and an even crop meant an even yield. Therefore they should plough into the hard patches and maintain the drill hoes clear and free running, &c. Whilst on that point they should note the drawback to disk implements, which worked the under layers of the soil very unevenly, and cut the soil particles very fine. With reference to the time at which to sow wheat, that would naturally vary with the seasons and conditions, but in that district it would be advisable to sow as early as possible after the first substantial rain in autumn. The soil was in the best condition to receive the seed when it was in a moist and friable state, but that nice condition was not always possible, and a certain amount of dry sowing was unavoidable, but it should not lead to any very harmful results whilst the land was new and free from weeds, but after the first crop it would be well to avoid it as much as possible. Care should be taken to avoid the malting of the grain, and seed should not be sown into soil that was only slightly moist. Personally he recommended sowing after the first good fall of rain in April, but should rain hold off he would not delay operations long into May. Only the best seed should be sown. With plant life, as with animal life, the best parent produced the best offspring; therefore, whenever possible, selected as well as graded seed should be used. If such seed were used it would not be necessary to introduce a change of seed from time to time. Varieties varied with the climatic and soil conditions, and it was only by systematic experimenting that the most remunerative variety could be discovered for each especial district. In countries and districts having long winters and short summers wheats of long period of growth returned the greatest yields. Those wheats crept about the surface of the soil longer, and tillered more extensively than the early, quickly-growing wheats. In countries of short winters and long summers it was found that early, quickly-growing wheats returned the greatest yields, as they were more towards maturity, and therefore not so badly affected, should the summers set in quickly. Further, it was necessary to consider the fungus disease of red rust. The early wheat usually secured a lead over that, and was therefore more or less rust resistant. Other points to consider in selecting varieties was the strength of straw, especially in rough-weather districts, and the holding capabilities of the chaff. Up to the present it had not been sufficiently advantageous for the farmer to seriously consider the strength of flour of wheats. For that district the best results should be secured by growing early wheats such as Gluyas and King's as bulk plots, with a smaller area of a good rust-resisting mid-season wheat such as Queen Fan. The quantity of seed to sow for a grain crop was dependent on the class of wheat, the strength of soil and climate, and the time of seeding. Early low tillering varieties required a thicker seeding than the slower growing greater tillering class. Rich soils would stand a heavier seeding than poor soils. Similarly lands of heavy rainfall could carry more plants to maturity than those of light rainfall. Dry sown and late sown crops required to be seeded a little more thickly than crops which were sown when the soil was in a nice moist friable condition. Really the point with regard to the quantity of seed to sow was like the choice of variety, best decided by practical experience in each respective district. Considered theoretically, they sowed wheat very thickly. For instance, when they sowed 60lbs. of seed to the acre, it meant that they only required for every seed sown to harvest 30 similar grains (only a medium-sized head of wheat) to produce a 30bush. crop, and if they grew wheat plants a link apart they should require only average plants, *i.e.*, plants producing six-headed, averaging about 35 grains per head, to produce the 30bush. to the acre. From that it was easy to see what large results could be obtained when wheat was grown under good garden conditions, where it was easily possible to secure up to 80 or 100 stools per plant. However, from an economic point of view such a procedure was out of the question, because wheat must remain a cheaply-produced crop, and hence they sowed comparatively thickly to avoid costly seeding, and after cultivation treatments. He recommended in that district, sowing the early wheats at the rate of 60lbs. per acre, and the mid-season and later wheats at the rate of 50lbs. per acre. With regard to the depth of sowing, 2in. was plenty. In light soils it was advantageous to go a little more deeply. It was necessary to follow the drill with a light harrowing to ensure that the seed was covered uniformly. Mr. E. J. Turley did not favor Gluyas as a bulk crop, because of its great tendency to lodge. Mr. G. V. Lindquist agreed that Gluyas was a risky wheat, especially on stumpy land. He greatly preferred King's for that district. In answer to a question Mr. Cook said that he recommended 1cwt. of super. to the acre as a general dressing of manure for that district.

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## SALT CREEK.

April 5th.—Present: nine members and three visitors.

**Will Pig-raising Pay on West Coast Farms?**—A paper was read by Mr. W. H. Gale in which he discussed the question whether pig-raising on the farm would pay on that side of the gulf, and he answered the question in the negative, because the care of the pigs entailed so much work that it would be necessary to neglect other duties or work very long hours. Besides that the expense of getting the pigs to Cowell and thence to the Adelaide market was about 12s. 6d. each. The pigs should be sold when about six months old, because if properly cared for they would then weigh 70lbs. or 80lbs. After that they did not improve quickly in proportion to the quantity of feed which they consumed. If there were a bacon factory on that side of the gulf the pigs might pay. Mr. W. Lee, sen., thought it would pay farmers to keep pigs for their own use.

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## YALLUNDA (Average annual rainfall, 18in. to 19in.).

March 31st.—Present: four members and two visitors.

**Sheep on a Farm.**—Sheep were one of the best paying lines on a farm, declared Mr. R. B. Jenkins in a paper on that subject, if they were worked to the best advantage. It was essential to obtain as good a class of sheep as possible. He favored getting ewes cast because of their age from some well-known sheep farmer because they would be found better than young ewes procured from the same source, since sheep farmers would only sell the culls when young. It was also imperative to get the best ram procurable. Of course that depended on one's pocket, but it should be remembered that the future flock depended to a very great extent on the ram. In that way a farmer should be able to establish a nice little stud, and in time, with careful culling, should have a good flock. An exchange of rams, after a year or two, between farmers could be worked to great advantage. Small paddocks were indispensable to successful sheep farming. The sheep would do twice as well if changed from one paddock to another at short intervals, and the paddocks would grow more feed. There was always a shortage of feed at some part of the year if they carried anything like the stock they could carry in the flush of the season. That could be overcome by a little hand feeding. A stack of straw, a heap of cocky chaff, and a small paddock of kale or other fodder would be found to almost double the carrying capacity of the farm, and a good return should be secured for a small outlay. In that district lambs did not seem to grow well on the native grass, but if kept on land that had been worked, they developed into well-framed sheep. Sheep required access to plenty of water during the summer months. In keeping fallow clean and manuring the soil sheep were a great help. Mr. Olston said that sheep were very valuable for enriching the soil. He had realised 12bush. off a paddock where sheep had been pastured, though the land would not grow a crop before that. He favored the Leicester and Merino cross for that district.

BUTLER, March 26th.—Mr. G. W. Bray read a paper on preparing the land for seed, in which he emphasized the necessity for preparing a good seed bed. The ideal seed bed for wheat was land free from weeds, which had been ploughed up, and so worked down that only the immediate surface was loose and the underlayers well compacted.

CUMMINS, April 7th.—The meeting took the form of a district conference, representatives being present from Yallunda and Yeelanna Branches. Through a misunderstanding no paper had been prepared, but the subject of co-operation was discussed. Mr. Jenkins (Yallunda) said that the Government should co-operate with farmers, especially on the West Coast. Mr. S. Trigg, to show what land in the district would grow when properly cleared and worked, instanced experiments on Mr. F. Lambe's farm, where 100 acres were fallowed with eight horses and a four-furrow plough. Twenty acres were cultivated after every rain (four times). Eighty pounds super., and 55lbs. of wheat were drilled over the whole area of 100 acres. The 20 acres averaged 42bush. to the acre, a total of 840bush. The remaining 80 acres averaged 10bush., or a total of 800bush., so that the 20 acres cultivated yielded 40bush. more than the 80 acres which were not cultivated.

GREEN PATCH, April 2nd.—Discussion took place as to the growing of kale. Mr. C. T. Parker said that Mr. G. Proud had three experimental plots sown respectively with ¾lb., ½lb., and ¼lb. of seed per acre, and the last-named gave much the best results.

KOONIBBA, March 8th.—A paper on wheat cleaning, in which the relative merits of the power winnower and harvester were compared, was read by the chairman. A lively discussion took place. It was admitted, however, that in a season such as the present one the harvester easily held its own, one man only being required to operate it, whereas at least six men were necessary to work the power winnower successfully. Though three or four might work it, the labor was too severe in good heaps, and it was impossible to sew up the bags. It was admitted that rough ground was not good for harvesters. Ultimately the further reading of the paper and discussion were adjourned until next meeting.

YADNARIE, April 7th.—Discussion took place in regard to the poisoning of foxes, and the opinion was expressed that it was advisable to co-operate and arrange for farmers to lay poison on a certain day to be fixed by the different Branches of the Agricultural Bureau.

# EASTERN DISTRICT.

## (EAST OF MOUNT LOFTY RANGES.)

### BOOKPURNONG EAST.

March 24th.—Present: nine members.

**Preparing Soil for Seeding.**—In order to extract as much from the land as possible at every cropping, every acre cropped should, remarked Mr. A. H. Schulz, in a paper on preparing the soil for seeding, be previously fallowed, because in nine cases out of 10 fallow would produce the heaviest crops. Land for fallow should be ploughed at least 3in. to 4in. deep where the soil was of a heavy nature, and not deeper than 3in. in sandy soil. To save considerable work this should be done before the grass and weeds had seeded. Care should be taken that the soil was well turned over. About a week or so after ploughing it should be well harrowed and then left until weeds appeared. If wet enough it should be scarified or gone over with a skim plough, just as shallow as possible if good work were to be done, and therefore it should never be left until the weeds were deeply rooted, or they would be difficult to destroy. He was averse to cultivating fallow when dry, and would advise turning sheep on to eat off weeds instead of scarifying. Should there be any rain during harvest or at any time before seeding, the fallow could with advantage be harrowed again in order to conserve moisture. Land so prepared would, when seeding time arrived, only need to be scarified or skimmed in shallow fashion before drilling. Time should be given the grass seeds and weeds (if any) to germinate before scarifying or skimming. Since they were not in a position in that district to have all fallow land for cropping, he would also deal with stubble land and new land. In his opinion stubble land should be worked over as soon as possible after burning off in order to secure the benefit of the ashes, and it should not be worked to a greater depth than 2in. That operation should be commenced immediately after harvest in order that the early rains might soak in and make a firm seed bed. In soil of a sandy nature a good scarifier would be sufficient to do the work, but in heavier soil a disk plough would do better work than a share plough, especially if the soil were dry and hard, and it would loosen enough soil to make a good seed bed. Should the surface set too hard for drilling a light cultivator or a set of sharp harrows would loosen sufficient soil to cover the seed. In dealing with new land the best results were obtained by preparing and ploughing it before harvest, and working it on the same principle as fallow land. As most people in that district were unable to do that for lack of time, it was usually left until after harvest. In that case new land should be ploughed as early as possible, and ploughed thoroughly to a depth of at least 3in., and then harrowed several times over to make it firm and even for drilling. It would be advisable to postpone ploughing until after a good rain, in order to enable the plough to do good work. All stumps and roots should be picked off before drilling. It would pay much better to prepare a small area properly than to attempt preparing a large area and finally have to neglect it. The discussion turned on the relative merits of the disk and share plough and the depth of ploughing. The consensus of opinion was in favor of the disk in rubbish. If used properly it would not ridge the ground much, and for general scrub purposes was excellent. About 4in. was the average depth of ploughing recommended. One member said that he fallowed 8in., and reaped 27 bushels, and on a 5in. fallow he reaped 30 bushels.

### BOOKPURNONG EAST

April 21st.—Present: 10 members and two visitors.

**Dealing with Inferior Wheat.**—To dispose of inferior wheat, observed Mr. B. Schier, in a paper on the subject of dealing with inferior wheat, means accepting a lower price, which would involve the farmer in loss. It would be far more profitable to use such grain for feeding purposes, if the amount docked were heavy. Feeding pigs and poultry on wheat would show a profit, better than 5s. per bag, at any time. There was always a market for smutty wheat if the grain were good. When cleaning smutty wheat with power winnowers it would be advisable, in order to avoid smutty-tipped wheat, not to pass the tailings over the winnower a second time. In that way the sample would be cleaner, but there would be a heap of stuff to be cleaned up, probably only good for feed, but only a light "dock" would be imposed on the rest. If the dock were 2d. per bushel it would pay to clean it again, when it would probably turn out f.a.q. Barley caused as much, and perhaps more, trouble in the sale of wheat than smut. It was more difficult to remove barley than smut, because it was just as heavy as the wheat, and would not blow out. Millers did not like barley because of the expense in removing it, and therefore they valued wheat with barley in it at a rate considerably under market price. There was a considerable amount of mouldy wheat during the present season, and mouldy wheat was good only for feeding purposes. A very low price obtained for such wheat, and it would pay farmers better to feed it to pigs or crush it and fatten sheep with it. In the discussion which followed members were in agreement on the following points:—That smutty wheat should not be sown; that seed wheat should be pickled well; that wheat should be removed as quickly as possible after stripping in order to keep the land clean; that rubbish should be kept out of the seed by using a grader, and that mouldy wheat should not be fed to stock, especially when they were pregnant.

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## MONARTO SOUTH (Average annual rainfall, 14in. to 15in.).

March 31st.—Present: 15 members and three visitors.

SUITABLE LAND FOR SEEDING.—In a paper on suitable land for seeding, Mr. A. P. Braendler observed that the land which grew the best crop in that district should not be cropped oftener than once in three years, and be fallowed and well worked. In winter it should be cultivated, drilled, and harrowed after the rain (not too wet) to obtain the best results. If land, which was not fallowed, was to be put under crop it should be kept as clean as possible with sheep running on it for two or more years. Dry grass, straw, or other rubbish of any kind should not be ploughed in but should be burned off. The cleaner the land the better the crops would be, especially in a dry year.

NEGLECT AND RESULTANT WASTE.—Premising that no nation was more negligent and wasteful than the Australian, and that the worst of them was the farmer, Mr. C. F. Altmann, in a paper on neglect and resultant waste, contended that the number of implements neglected in Australia was beyond understanding. He had seen a stripper with the wearing parts as sound as a bell and the woodwork rotted away. The machine was not worn out, it was wasted. It would have paid that farmer handsomely to buy a few sheets of iron and put up a shed for his machine, even if it were only a small affair, if he could not afford something better. He wondered how many tons of fencing wire were carted about on Australian farm implements. Breakages would not be nearly so numerous if all bolts were screwed up tightly. If one happened to break it should be replaced at once. If no wire were used the majority of ploughs and cultivators would last at least four or five seasons longer. Scraps of iron should never be left to lie about, but should be used for making bolts, etc. Many a good sickle on a binder had been spoiled through a piece of scrap iron. The waste in harness through neglect eclipsed all other. Instead of having breaks properly repaired, a couple of holes were bored and then mended with binder twine. Such contrivances did well for makeshifts, but as a rule the twine was left there, and if worn through a fresh piece was put in. Such harness would wear out, or rather, waste away very quickly, and was always unsightly. On some farms wherever work was finished the chains were dropped and left there until used again on some other implement. Chains would not improve if left on the ground for months. The swings were also left to take care of themselves. As a rule the white ants had the best of them. If kept well painted and housed when not in use they would last infinitely longer. The same applied to tools with wooden handles. If they were put away carefully in a dry place when not in use they would wear out, not waste away. In no case should implements with woodwork be left exposed to the weather. Ploughs, cultivators, &c., need not be housed if they were kept in paint. Steel and iron would not deteriorate if properly painted. All springs and such implements should be kept dry when not in use, or they would weaken very quickly. Many tons of hay had already been wasted because the farmer thought he had plenty of time to put straw on the stack before the wet weather set in, but was caught by a passing thunderstorm and the hay badly damaged. Great waste also occurred through farmers sowing cracked and inferior seed. Instead of properly cleaning their seed they would sow it as long as they could get it through the drill. The consequences were that several feeders failed to distribute the seed, and the crop was uneven. That was especially the case if barley were sown. Instead of seeing that the beards were removed, and it paid very well to do that, the beards were sown and then there were big strips in the crop missing. That was waste of, in many cases, good land.

## WYNARKA.

February 17th.—Present: eight members and five visitors.

**Experimental Plots.**—The report on the work at the experimental plots was as follows:—Variety tests (conducted by Mr. Hood)—Bunyip, 11bush. 32lbs.; Florence, 12bush. 11lbs.; Gluyas, 15bush. 5lbs.; Budd's, 17bush. 19lbs. In each case 45lbs. of seed and 60lbs. super. were sown. Conducted by Mr. Richardson—Silver King, 12bush.; Belgian Surprise and New Zealand Blue, each 10bush. In each case 45lbs. of seed and 70lbs. of super were sown. Quantity super. tests (conducted by Mr. Schultz)—Super, 56lbs., yield 14bush. 41lbs.; super. 80lbs., yield 14bush. 55lbs.; super. 112lbs., yield 14bush. 56lbs.; super. 156lbs., yield 14bush. 47lbs. In each case 45lbs. of German Wonder seed were sown. Quantity of seed tests (conducted by Mr. Black)—Federation, 30lbs. sown, yield 10bush. 48lbs.; 45lbs. sown, yield 10bush. 16lbs.; 60lbs. sown, yield 10bush. 57lbs.; 75lbs. sown, yield 9bush. 40lbs. Conducted by Mr. Colton—Silver Baart, 40lbs. sown, yield 14bush. 38lbs.; 50lbs. sown, yield 17bush.; 60lbs. sown, yield 18bush. 38lbs. In each case 60lbs. of super. per acre was used.

CLANFIELD, April 7th.—In a paper on treeplanting Mr. W. A. Hoar emphasized the necessity for some action, if for no other reason than to provide firewood and fencing material in the future. Fruit trees should also be planted in order to avoid paying the exorbitant prices demanded for fruit. All members agreed that something should be done by all farmers in the way of tree planting.

KINGSTON-ON-MURRAY, March 24th.—Mr. S. Sanders read a paper on codlin moth, in which he stated that the pest did not exist in the Murray Valley, and that to keep it free neither apples nor pears nor secondhand fruit cases should be permitted to be brought into the district. When trees were infested they should be sprayed with arsenate of lead, but it was useless for one man to spray if his neighbor neglected to do so, and allowed the pest to flourish.

LAMEROO, March 10th.—Members discussed harvest results, which disclosed both good and bad crops. Takeall had played havoc with some crops, and barley grass had done damage in places. One member reported having used bonedust and super., with the result that he had reaped 37bush. of wheat per acre. In his opinion that was the best class of manure for that district. Mr. A. J. Koch reported the results of two sets of experimental plots, one acre each, for 1916-17. Different brands of super. were used with each set, and were sown with 55lbs. Yandilla King per acre. The yields were as follows:—Plot 1 (40lbs. super.), 20bush. 34lbs. per acre; plot 2 (75lbs. super.), 22bush. 34lbs. per acre; plot 3 (150lbs. super.), 25bush. 58lbs. per acre; plot 4 (40lbs. super.), 22bush. 40lbs. per acre; plot 5 (80lbs. super.), 25bush. 32lbs. per acre; plot 6 (150lbs. super.), 28bush. 10lbs. per acre.

MURRAY BRIDGE, January 30th.—Mr. C. G. Savage (manager of the Blackwood Government Orchard) explained at Mr. Sladdin's orchard, the methods of summer pruning and budding. In the evening Mr. Savage read a paper on drying and preserving fruit for home supplies.

RAMCO, March 12th.—A paper on watering, cultivating, and manuring an orchard was read by Mr. H. Green, and caused considerable discussion, members in the main agreeing with the views expressed. Mr. F. G. Rogers was averse to watering with a full stream at first. If the incline were steep a trickle would be too fast. It was advisable to begin with a small stream and allow it gradually to soak to the end. Then it should be banked up and allowed to flow a few hours longer. Mr. L. Darling said if the land were ploughed 14in. deep as the paper suggested, the water would soak in. In reply to questions Mr. Green said that he preferred the cultivator to the disk, because the latter would run over hard pan. Nitrate of soda was good for fruit trees. For green manure he would plant peas in alternate years, ploughing them in after flowering at the end of August or the beginning of September at the latest.

RAMCO, April 15th.—Discussion took place on pruning the vine, particularly currants. Mr. R. Dunning said that two methods were adopted in that district, cordon and espalier. From his experience, if the vines were exposed to the wind he preferred the cordon system, in which case the side with the wind had twice the growth of the other. Under that system, closer planting could be adopted. He recommended one cordon on the top and one on the bottom wire, and so cover all trellis. On the advice of an expert he had tried short-arm pruning, and he noticed that the currant bore from the first five or six rods. Near the main arm fruit was poor, the most prolific fruiting being at the top of the vine. By leaving four or five nodes instead of a long arm an abundant crop was produced. He used vine manure for the vines. It had an effect on tonnage, but it was not wise to use too much. It made the berries very large and full of sap, therefore it was better to manure on the light side, because better berries were produced and they were a better color. Mr. F. Lewis said he used the cordon system with one arm, the first vine on the bottom wire and the next on the top, the vines being 12ft. apart. Mr. H. Green remarked that he had seen the T system adopted, and it was the best of all. Mr. L. Darling said that he took the rod and twisted it and found that the vine bore well.

WYNARKA, March 10th.—Members discussed crop returns, which in some respects were very satisfactory, some varieties returning over 15bush. to the acre. Several members reported that the best crops had been produced on land which had been well ploughed, the difference in one case being over 10bush. per acre.

## SOUTH AND HILLS DISTRICT.

### BLACKWOOD (Average annual rainfall, 27in. to 29in.).

March 19th.—Present: 10 members and one visitor.

Asparagus.—An easily-grown and cheaply maintained plant was asparagus, remarked Mr. L. Porter in a paper on that subject, and to those who relished it the question of its more extensive cultivation was sure to provoke interest. It was admittedly one of the most expensive vegetables on the market, and yet if the cost of cultivation were any criterion it ought to sell at a rate per pound which would be a little more than rhubarb. The main reason that it was only sold in a few shops, and was looked upon somewhat as a luxury, appeared to arise from the fact that, as with other little known vegetables, the public had not acquired a taste for it, nor were they aware of the proper way in which it should be cooked. But why, it might be asked, should the future success of asparagus be hampered, and its day long delayed because of ignorance on the part of housewives? Asparagus was a perennial herbaceous plant of branching habit, and often reached to 5ft. or 6ft. in height, that was, of course, when not cut back. The chief feature about the plant was its large root stock and fleshy roots from which it drew nutriment during the dormant winter period. It was upon the vigor of that root-stock and root system that its value depended, thus enabling it to send up, with the return of warm weather, varying quantities of young sprouts, which really formed the subject of the paper. The "Farmer's Handbook of N.S.W.," from which he had extracted some information regarding its cultivation on a commercial scale, stated that asparagus was extensively used as a vegetable, and he understood that that was a fact so far as New South Wales was concerned. At the Bathurst Experimental Farm the varieties which had proved the best results were Counderer's Colossal and Pride of Brunswick. Market gardeners in the mother State preferred Counderer's Colossal and Palmetto. Generally speaking all the classes of land in Coromandel Valley would grow asparagus, providing it was irrigated. It required plenty of sunshine, and should have a northern aspect. Cultivation might be dealt with under two headings—Kitchen garden and market garden. As to the kitchen garden, he had been very successful with the small patch he had planted, and which he hoped gradually to extend. To establish the bed the seed should be planted as an ordinary cabbage bed would be, but, as asparagus germinated slowly the process was hastened if the seed were soaked in warm water for 24 hours. The seed should be covered not too heavily, but it was safe up to 1in. deep. If the bed had been specially prepared strong plants could be obtained in one year. He left his for two years. Should two year old plants be used those with imperfect flowers which did not bear seeds should be selected, for the reason that seed bearing tended to exhaust the plant. The permanent bed should be trenched to about 24in., and filled up with farmyard manure, old boots, and compost sprinkled liberally with bonedust. The young plants could easily be transplanted if ordinary care were exercised, and the roots were not exposed to the sun or drying winds. The crowns should be kept straight upward and covered with two or three inches of soil. If blanched asparagus were required—that was white sticks—it was necessary to keep on covering with good rich soil or manure. If green asparagus were desired the heavy top dressing should be omitted. It was well, in any case, in order to keep the bed maintained, to top dress at the end of every winter. A bed so established would last a lifetime, and a patch, say 6ft. x 12 ft. would supply a medium family with ample asparagus right through the growing season. If market gardeners commenced with a kitchen patch and persevered with it; getting their families to acquire a taste for it, and passing some on to their friends, it would help considerably in creating a demand. The experience so obtained would enable them to launch out the better on a commercial scale. In growing for the market, instead of adopting the rather laborious seed bed method, the French plan would prove more economical. The seeds should be sown in the field at once, and the work of planting out saved altogether. The system had been described as follows:—"After the land has been ploughed and cultivated, strike out furrows from 5ft. to 6ft. apart, according to the richness of the soil. The ploughing should be deep—up to 12in. if possible—and it is preferable to plough twice in the one drill, throwing a furrow each way from the centre of the row. Then work a single-horse cultivator (closed up) in the bottom of the furrow to loosen the soil in the bottom of the drills. Make hills 20in. apart in the furrow, mixing the soil of each with a shovelful of well-rotted fine manure. Sow four or five seeds in each hill, and cover lightly with good soil. The hills should then be watered and kept moist until germination, which will take about three or four weeks. After germination the plants should be thinned out, leaving only the strongest plant in each hill. Keep the soil loose and free from weeds, and, as the plants grow, well-rotted manure and soil are applied, a few inches at a time, round each. The filling up goes on steadily, care being taken not to choke the plants until the drills are filled. The after treatment consists in keeping the land free from weeds, and, in the case of a large field, frequently cultivating to conserve moisture. When the stems turn brown they are cut away, and this allows the easy application of manure during winter. Asparagus, to be profitable, should be forced, and quick-growing succulent shoots should be aimed at. Old established roots could be cut for about 10 weeks before being allowed to run up to stem and leaf. The small, as well as the marketable shoots should be cut clean away; otherwise they exhausted the roots and reduced the output. If blanched asparagus were required it should be cut as soon as the tops showed about ground, and about 8in. or 9in. below the surface. For green asparagus the shoots should be cut when about 7in. high, cutting 2in. below the surface. To secure a stick half white and half green the shoot should be cut when about 4in. high, and about the same distance below the surface. In New South Wales green asparagus was most popular, probably because if grown quickly, the green shoots were more tender and had not developed the stringy outside shell which was generally found on the bottom end of the white shoots. In the Goulburn district the growing of that crop had proved a profitable sideline to orcharding. The asparagus was planted in single rows midway between the rows of trees and the beds were now a few feet wide. As an instance of the lasting qualities of the crop it was stated that at Goulburn there was a small bed, still bearing heavily, which was established when the property was taken over by the present owner in 1868. That made the bed now 48 years old at least. The weight of a bundle of asparagus, as sold in South Australia, varied from 12oz. to 16oz., and the price to the grower over a season averaged 6d. per bundle. At the commencement of the season it realised 1s. wholesale. One grower near Adelaide would never accept less than 8d., and a very large retail dealer in asparagus stated that that grower was able to take his stand for the reasons that he was practically the only one who produced green asparagus; and also that the supply available in Adelaide did not meet the demand throughout a season. As far as could be ascertained the growing of asparagus in South Australia was confined to a few gardens along the valley of the Torrens, at Hectorville, and the Reedbeds.

EQUALISING FRUIT CROPS.—In a paper on this subject Mr. W. Turner said that in South Australia they had an overflowing apple crop one year and the following season not enough for their own requirements. Thus the export trade they had was totally lost during those off years, and had to be worked up again for the next big crop. It seemed to him as if the orchardists could do something in the way of pruning or thinning when they had a big crop to cause the trees to carry a more regular crop every season. It would be a great benefit to themselves as well as the State. Tasmania seemed to have more equal crops than South Australia, and never seemed to miss exporting. Perhaps climatic conditions had something to do with it, or it might be the varieties of apples they grew, as some varieties cropped more regularly than others. The Cleopatra, for instance, appeared to be South Australia's most regular cropper, but in some districts that year it had been a total failure. He believed that "black spot" had something to do with that during the present season. They had had a very wet season, and spraying had been somewhat neglected. Dunn's Seedling was about the most irregular cropper in South Australia. They had an overflowing crop one year and not an apple the following season, but they had been slightly neglected as regards pruning. Jonathan trees, which had been growing very strongly, and were summer pruned last year had a nice setting of fruit during the present season. He believed that summer pruning and thinning out of the fruit when they had a big crop would do something towards a more regular yield.

## BLACKHEATH.

April 6th.—Present: 10 members and five visitors.

Best Wheat for the District.—The best wheat to grow in that district was Federation, but not for hay, remarked Mr. H. Pym in a paper dealing with that question, and also the pickling of wheat. There were a number of other kinds or varieties which were better for hay. Federation was short and strong in growth, and did not shake out with the wind and stormy weather. It stooled out well, and did not require more than 40lbs. to 50lbs. per acre for seed. It should be sown on good, heavy soil, and not before the second week in May. Farmers should avoid sowing Federation on loose sandy soil because it was liable to be attacked by take-all. Every farmer who had land suitable for growing Federation should sow a portion of his paddock with it, because when ripe it could be reaped at any time as long as it was not wet. It was very easily thrashed. It weighed a little on the light side, but it made up all the difference in the number of bags it filled. There were many other varieties of wheat throughout the State that had not yet been tried, but at present he recommended Federation for growing grain and Purple Straw, Bluey, and Marshall's for hay purposes. Those three wheats were slow in growing and they stood more wet than early varieties. Now, when bluestone was ruling at such high prices the best plan for pickling was to use a tank or a barrel to dip the wheat into. The wheat should be completely immersed, but should not soak for more than a few minutes. About 1lb. of bluestone should be used to every 7galls. of water. If the seed wheat had smut balls in it it should be sold, and fresh clean seed used. The farmer who sowed smutty grain would reap smutty grain. Members generally agreed that Federation was best for grain, and Bluey best for hay in that district. It was also agreed that bluestone was a preventive, not a cure, for smut, and that 1lb. of bluestone to 10galls. was a sufficiently strong mixture.

## CYGNET RIVER.

April 5th.—Present: five members.

Care of Farm Harness.—Mr. C. F. Miller read a paper on the care of the farm harness in which he pointed out that owing to the frequent rains on Kangaroo Island special care should be taken of harness. In the first place only the best harness should be purchased, because, though it cost a trifle more in the first outlay, it was cheapest in the long run. Twice a year the harness should be given a dressing of 4oz. of lamp black to 1gall. of neatsfoot oil. The harness should be thoroughly cleaned with hot water and soft soap and thoroughly dried before the dressing was applied. A few awl blades, a patent awl haft, half a dozen saddle blunts, a ball of hemp, and a lump of beeswax should be on every farm. A clamp to hold the work could be made of two cask staves screwed together at one end and fitted to come in close contact at the other. By stitching, a stronger job was effected than with copper rivets, and it looked much better. He was averse to soaking new collars for horses in water before using, because it was unnecessary, and had a tendency to cause the straw to rot. A collar should be bought to fit. No matter how hard a collar might become it would not hurt the shoulders if they were thoroughly groomed before the collar was adjusted. Every farmer should be able to line and stuff his horses' collars. That might seem difficult, but it was very simple by the use of a little collar check and a small quantity of curled horsehair. The check would be purchased, but the horsehair might be obtained by saving the hair pulled from the horses' tails. To curl horsehair it should be thoroughly washed, and whilst still wet, twisted into a rope with the aid of a carpenter's brace. Then the rope of hair should be boiled for half an hour and dried. Afterwards it should be put into a camp oven and baked with a slow fire, care being taken not to burn it. Many advocated a separate room for harness, but he preferred to hang each horse's harness at the head of the stall because it expedited harnessing and unharnessing. If the stable were kept clean, and disinfectant freely used the harness would not deteriorate.

## INMAN VALLEY (Average annual rainfall, 26in. to 27in.).

April 5th.—Present: seven members and two visitors.

MAKING THE MOST OF A SMALL HOLDING.—Mr. A. Lovelock read a paper setting forth the method of working a small holding to the greatest advantage. He divided the subject into two classes—(1) holdings from 80 to 150 acres in extent, and (2) holdings of from 20 to 80 acres. In either case it was essential that the holder should determine what particular line he intended to adopt to make his land keep him and his family and then put his whole mind and strength into the work without weakening or attempting to change his purpose, until absolutely assured that he was on the wrong track. All the time spent in trying new ways and experiments on the block was generally speaking valuable time wasted, and the owner was not any further ahead than when he first took over the holding. Blocks of the first class, that was 80 to 150 acres, in that district, should be worked as dairy and fowl farms; the owners growing only sufficient for the requirements of their own stock—that was to say, enough hay, corn, and green stuff for the stock on their holdings during the 12 months. The cows, if carefully selected, should average £14 per head per year in butter alone, taking the rates prevailing for the last three years. He would then still have the separated milk for his calves, pigs, and fowls. The calves should all be marketed as soon as ready, and not saved to rear except in the cases of heifer calves from specially good milkers, because the feed which the calves consumed would keep another, or perhaps two extra, cows. He should rear his own pigs by keeping two or more good breeding sows. The litters of those sows should be marketed when they would dress between 80lbs. and 100lbs., because pigs of those weights always realised a good price, and did not require a large amount of food to make them marketable. They were not long in the sties, and so gave a quick return. Then 100 or more fowls should be kept. It was advisable to have both the heavy and light strains. In the fowlyards almond trees should be planted, because they afforded shelter for the fowls, and soon came into bearing. The almonds, when picked, added considerably to the returns of the farm. In the second class of blocks, those from 20 to 80 acres, the land would be best utilised in apple and currant growing. The holders should be careful to plant only the very best of export apples, and only enough trees of the stone fruits, such as plums, peaches, apricots, &c., to supply the demands of the community within easy reach of his garden. The currant vines should be planted on the poorest parts of his holding. They would soon grow and bear, and there was always a good market for that produce. He knew an instance where eight acres of currant vines in the third year produced over £100 worth of currants.

## KANMANTOO (Average annual rainfall, 17.90in.).

April 7th.—Present: seven members.

PROCURING AND PROTECTING FARM IMPLEMENTS.—The success of a farmer, declared Mr. R. G. Critchley in a paper on procuring and protecting farm implements, depended largely upon his knowledge in selecting, and his care in protecting his implements. A farmer should use his own judgment to decide which machine or implement he required, and he should select an implement from what he had seen of it, and not on what he had heard of it. An implement successful on one class of land was not always just what it should be on another. For the protection of implements it was well to keep them under cover, because exposure to the weather had a very bad effect. If implements constructed of steel were left out in the weather the paint chipped off, and the iron or steel rusted. The nuts would become tight and the threads rust off. Having finished working a machine, all the accumulated dirt and grease should be removed and a note taken of all necessary repairs. All implements, both wood and iron, should be painted before they were taken out for use. That would not only make the implement look like new, but would give it a much longer life. Painting was especially necessary for the harvester, because a good deal of light wood was used in its construction, and unless painted frequently the weather would cause the wood to swell and warp.

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### LONGWOOD (Average annual rainfall, 37in. to 38in.).

April 7th.—Present: nine members.

Orchard and Orchard Work.—The concluding portion of Mr. C. H. Beaumont's paper on this subject was as follows:—"Having planted the trees, the main object of the orchardist is to get good and quick growth on all of them. The principal factor in obtaining this is good and thorough cultivation. Cultivation means freedom from weeds and set ground. After planting, during the first season, the implement known as the orchard cultivator is one which should be often in use. Keep the soil loose, and especially go over it after wet days. It is an advantage to work the land first one way and then cross the work, but if this is not easy to manage, the work may be done by crossing in and out through the trees, cutting the figure eight, so to speak. This will not leave very much for the hand hoe. Care should be exercised, when working up to the trees, not to damage the butt or to pull up the roots. Ploughing is the main operation for the winter. It is advisable to do the first ploughing as soon as the ground is fit. I like to plough up to the trees with a single plough for five or six rounds and then complete with a double-furrow plough. The depth near the trees should be 3in. to 4in., and the remainder 5in. to 6in., varying the depth each year. Leave the first ploughing in the rough or clod. Towards the end of winter, or in the early spring, plough away from the trees and level the soil again and thoroughly work with harrows to fine tilth, and thereafter with the cultivator. I do not intend to go into the question of the best make of implements to use in the garden, but would suggest that the disk implements answer most of the requirements. It is beyond the scope of this paper to enlarge on matters of spraying and pruning, suffice it to say that every grower knows that to get good clean trees and fruit he must make use of the spray pump and the various preventives or remedies which have been proved to be the most efficient. We must know first of all why we are spraying, and then use the spray at the right time. If it is to prevent a fungus disease, such as 'black spot,' 'shot hole,' or 'curl leaf,' then the only sprays worth considering are those compounded with bluestone such as Bordeaux mixture and Burgundy mixture, and the time to use them is before the opening of the buds and again when the leaves are starting to fall. Insect pests must be dealt with when observed or when known to be about, and the remedy is either the use of poison or some sticky or penetrating material. For codlin moth the compound known as arsenate of lead has no equal, and the powder form is the most convenient. The time to use it is just as the fruit is formed, or when the petals of the blossoms fall. The second spraying should be given about 10 days later as a greater safeguard. Later sprayings will be necessary for the late sorts of pip fruits, in fact a coat of spray should be always on the fruit. For red spider the main object is to destroy the eggs, and this may be done to a great extent by using red oil emulsion in the winter. If it becomes necessary to combat the insect or 'mite' itself at blossoming time, then use an emulsion composed of lime and sulphur, and this will kill the mites, without interfering with the blossoms if carried out in the early morning or during a cloudy day. For sucking insects such as the orange or peach aphis or the woolly blight, resin wash and tobacco water will be found the most effective. For woolly aphis it is necessary to hold the nozzle close in to disturb the insects. For a bad tree try pure kerosine, rubbing it on with a paint brush, follow up the treatment every few days and a great improvement will result. All of these materials can be bought ready for use made in Adelaide, and can be recommended as genuine, but if the orchardist prefers to make up the compounds himself he may obtain a pamphlet giving instructions at the Department Office, Exhibition Buildings, Adelaide. No orchardist should try to go on without spraying—it is really an insurance. Some years are sure to be different from others, and so disease varies, but the man who sprays properly is ready. Considerable perseverance is necessary in years like the one now past, but it is not often that the weather plays such pranks and spoils our work. The pruning branch of the work of the orchardist is one of the most important, and is also one on which opinions differ very much. The end in view is the same—to make, firstly, a fine strong well-shaped tree, and then to make it bear a lot of good fruit. To shape the tree must be the work of the first few years in the orchard. Fruit is not then required. Get three good main branches for a start, and the following year double the number, and so on. The quantity to cut out will depend on the tree and the sort, but make them strong. Trees which have made long growth do not require cutting back so heavily, in proportion, as the weaker ones. The pruning of young growing trees should be done during the winter. If any of the trees have been severely damaged by hares or by implements it is better to take them out at once and replace them, as they will only make dwarfed, unprofitable trees. When it comes to pruning for fruit then it will be necessary to study the variety. Some bear on the main limbs, others on laterals; some do better with winter pruning and others with summer pruning, but as a general rule it will be found that a tree in bearing does not require very much pruning. Mr. Quinn's book on the pruning of fruit trees and vines may be obtained from the Department or from seedsmen. It is so well illustrated that it is really a practical demonstration on this branch of the work of the orchardist, and no grower should be without a copy. I have heard some men say that pruning is all rot, 'Why not let Nature take its course,' they say. Well, have you seen it tried? I have, often; and I have noticed that Nature deals more severely than the pruner does. We should remember that Nature's way is to bear fruit as quickly as possible, reproduce itself, and then probably die. The quality of the fruit is not to be considered, and that is why we have to wage a continual warfare against Nature if the trees are to produce what we want. The finer and more delicate the variety the more difficult it is to produce. I had intended going somewhat extensively into the marketing of fruit. It has always appeared to me that the present method of marketing is very one-sided. The grower gets about 10 per cent. of the price paid by the consumer. This should not be. There is now on foot a movement for cooperation amongst fruit growers, apple growers particularly. The general idea is to establish centres for receiving the fruit, to grade by machine graders, to pack and export higher grades, to pack and store grades for the local market, and to use any marked fruit for drying or evaporating, or else to pulp it and pack for sale in large tins, and to make cider or vinegar of the refuse crops, &c. There is no doubt that the handling in bulk, such as suggested, must benefit the producer, and there is no reason why all fruits should not be dealt with by the system of co-operation.'' A unanimous vote of thanks was accorded Mr. Beaumont, this being the last of his papers for a time. His earnest desire to be of service to us has won our respect. We esteem him because he enjoys his work, and comes to our gardens as an inspector who is happier if he can teach us something. His papers have been instructive, and have been a medium of disseminating much knowledge.

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### MACGILLIVRAY (Average annual rainfall, 19in. to 20in.).

April 3rd.—Present: six members and one visitor.

Agricultural Development and Extension on Kangaroo Island.—To all who were interested in the prosperity of Kangaroo Island the problem of advancing on sound lines its agricultural resources was by no means a matter of indifference, premised Mr. H. C. Williams in a paper on agricultural development and extension on Kangaroo Island. He continued by observing that the present area under cultivation constituted a mere fraction of the whole, and sustained a proportionately small community, which was too sparse to be self-contained. The isolation from the mainland, though but a matter of a few miles, was one of the strongest reasons why the lack of numbers was a serious drawback to present settlers. With a larger population not only would cheaper transport be assured, but internal conditions, both economic and social, would improve accordingly. Progress was feasible, but it was important to warn newcomers against exuberant confidence and rash undertakings. They should husband their capital until they had adjusted their notions of farming with the actual requirements in their new sphere. Agricultural development applied more particularly to existing farms. On those varied cropping could be practised with the object of carrying more livestock, and raising the yield per acre. A few acres of rape, kale, turnips, mangolds, lucerne, peas, or other forage crops, properly grown, would make a small farm much bigger, as results went, than its area under a bare fallow-cereal-grazing system would indicate. A few points he wished to emphasize were (1) Thorough preparation of land for most of the above-named crops; (2) testing for germination of all doubtful quality seed; (3) liberal manuring; (4) planting mangolds in rows to allow of horse-hoeing or scuffling with a Planet Junior; and (5) judicious rotation. Agricultural extension, whether for cereals or other field products and by-products, was for the present confined within a radius of 20 miles or so of existing ports. If all the payable country within such a comparatively small location were cleared and worked to the best advantage the settlement of the remainder of the island would, by degrees find its own level, and command adequate transit facilities. The fine climate, good rainfall, and complete freedom from such pests as rabbits, foxes, and dingoes were grounds for optimism on that point. Land which had been abandoned only a few years ago by practical mainlanders was now changing hands at £6 per acre. Better methods were in vogue now than was the case then; and still better methods and discoveries were just as likely to follow.. New settlers needed to discriminate between prospectively payable country and the other class. If it were already cleared the task was not a difficult one to a man of experience and observation. But as most of the available land was virgin scrub there was more call on the ability to classify it in regard to its fertility or sterility. Mallee, apart from excessive limestone, could be taken to be a token of good soil. Narrow leaf, lavender, varieties of ti-tree on dry levels, gums, and strong growths of broom brush all favored the better soils. Wet areas carried bottlebrush, gums, paper bark, ti-tree, or otherwise proclaimed themselves. A section might contain good and bad land in mingled areas. If so it would be more profitable to open up the best of it first, even though such a course put the paddocks a mile apart. The commencement was weal or woe to the average selector. In other words, a fair return on the initial expense of cropping was more to the purpose than seeing an uninterrupted clearing which largely consisted of third-class land. New land should be fallowed the first year if possible, unless there had been a dense growth of scrub burned off it. Mouldboard ploughs with no draught on would dislodge more stumps than the disk implements. The depth of ploughing to commence with need only be sufficient to cut and turn the furrows. Free use of harrows was to be recommended to pulverise the soil, and extract stumps. On light soils, until the stumps had been well thinned out, the harrows would act as a substitute for the land roller in firming the seed bed. Crops to begin with on new land had to be decided upon with due regard to the experiments of older settlers. On fallow land of fair quality there should be no failure with wheat if the seed were from good crops grown in the locality. Considering that barley was so much grown, and such heavy yields obtained, it seemed that, when wheat was to be grown a variety approximating barley in several features would give the best results. Two characteristics from that viewpoint were a short growing period and easy thrashing. Wheats which were known as ''early'' sorts and easy to thrash, would do according to that theory. Walker's Early was being grown in MacGillivray, and was yielding very well. The term ''early'' differed in meaning from the ordinary use of the word, and it should be noted by non-wheatgrowers and learners. Early wheats were sown later than ''late'' varieties of wheat elsewhere. For Walker's Early, the time of sowing in that district was June and July, whereas a ''late'' variety would be sown not later than the middle of June. Oats were preferable to barley for a first and second crop when wheat was not grown, because they stood higher for reaping over the trash usually present on new paddocks as well as sweetening the soil, and furnishing a lot of straw, which was always worth having amongst the shoots. When a stubble burn was not obtainable recourse should be made to the harrows or something similar to drag the burning straw over the paddock; working with the fire going to leeward of the straw was the usual way. With reasonably clear land, until weeds became too numerous there should be no trouble to work on a system of bare fallow-wheat-oats-barley and grazing. A few acres near the homestead could be thoroughly worked up and subdivided into two or three acre lots, and used for such crops as early green feed (of which Cape barley was one of the best), mangolds, swedes, turnips, rape, lucerne, kale, potatoes, or anything similar that would ease the haystack, besides furnishing the means of growing bacon, eggs, and butter. As the farm became free of shoots, attention could be given to, first, cattle, and then, with more grass land available and safe fences, the keeping of sheep. At that stage the carrying capacity of the farm was more to the outback settler than the number of bags he could grow, and that brought him to the practice of agricultural development. In regard to manuring, though bone manures were beneficial the cheaper 36/38 mineral super. would give a quick return if sown at the rate of 120lbs. per acre. On special plots, like early greenfeed that possibly would have to stand a deal of feeding off and then be saved for reaping, an application of 2cwts. was a safe investment. Bone super. contained a little nitrogen, which would produce a taller growth than mineral fertiliser alone, therefore its use might be warranted where the best hay crop was required. Bonedust was more suitable for land under intense cultivation, and on orchard or lucerne lots. Top dressing growing crops with nitrogenous fertilisers such as ammonia and soda was a matter for careful experiment, so that the benefits might be compared with the cost. Farmyard manure was good in the right place if it were ploughed in and firmed well, should that be necessary. Perhaps one of the best uses for it was on a patch of early green feed, to be followed by a root crop. Ironstone country might be payable under correct treatment. First there was the question what was ironstone country? Much of it answered for itself by its pebbles of brownish hue and general aspect of inhospitality. Other so-called was not ironstone, but sandstone of similar color. That was not at all to be despised. The real ironstone apparently suffered from bad drainage as well as want of humus. The impervious subsoil was very near the surface, and did not absorb the heavy rains quickly enough to avert water-logging, with the result that the air necessary to sustain cereal crops was driven out. Consequently crops which looked pretty well at the start were suffocated when the rainy season set in. Two remedies suggested themselves—(1) Ploughing the paddocks in narrow strips with the fall of the land; and (2) bringing the subsoil up a little at each successive ploughing, thus deepening the top rooting soil. Actual subsoiling might be undertaken when stumps and other obstacles had been removed. Open drains for practical purposes would need to be cheaply made to interest a beginner. Supplying humus was the next necessity. It was quite possible of accomplishment by growing and turning in green crops of course, but again the settler had to stick to a schedule of ways and means. About the only thing for it was to return all the stubbles to the soil, supplemented by a few acres of rape from time to time. From the nature of ironstone soils to dry out hard on the surface, due presumably to the brace of defects above discussed, there was call for more than ordinary discretion in working on them with harrows and roller. A rough surface would better counteract the tendency to set than would one which had been smoothed down and consolidated by the two tools just named. That would be most noticeable during autumn and winter sowing. Lime might prove a factor in reclaiming the land of ironstone formation, and if so the material was boundless and close at hand. Meantime, with so much superior land on the island there was no need for any farmer to battle with the inferior ironstone as a primary undertaking. In the discussion which ensued members were averse to fallowing new ground, considering it most advisable to have a crop the first year. It was also agreed that sheep instead of cattle should be kept as soon as feed was available.

## MOUNT BARKER (Average annual rainfall, 30.93in.).

March 7th.—Present: 51 members.

Mechanical Devices on the Farm.—Each farmer must decide for himself how much purely mechanical work it will pay him to do on a farm, remarked Mr. B. Stephenson in a paper dealing with mechanical devices on a farm. In thickly settled districts it might be cheaper for the farmer to purchase most things, which he did not grow, but, in scattered localities the farmer should know how to effect simple repairs. If skilled labor were available it would be cheaper to hire mechanics for all important repairs, but every farmer should have simple tools and a workshop where many needed mendings and changes might be effected. All tools should be sharp, and for that purpose the file, grindstone, and whetstone should be kept handy. The method of sharpening tools could only be acquired by practice. In filing the cutting should be done by a motion away from the operator. In filing and setting saws the saw should be set firmly and truly in a clamp. A very good steel punch could be made by cutting off the tine of an old pitchfork. A forked branch of a tree could be used as a makeshift for a stone boat. Heavy stones could be rolled on to the fork and pulled by a horse. The same contrivance would be found useful in transporting many cumbersome articles a short distance. The wheels of an old mower could be used in a handy truck which would carry a reasonable weight. A handy knife for skinning a beast or sticking a pig could be made from a discarded pair of sheep shears, and a good chopper could be improvised by putting a handle on an old chaffcutter knife. A piece of old rubber hose drawn over the chains would prevent chafing on the sides of the fat mare when ploughing. Lorry traces made from hoop iron gave every satisfaction. A useful paintbrush might be made by passing a fine wire around the centre of several strands of horse hair and then pulling them through a piece of hose. The hose would act as a handle, and the projecting horsehair could be trimmed into shape with a pair of shears. A good land leveller to provide a smooth, even surface might be made of four pieces of 8ft. long 4in. x 4in. hardwood scantling, pinned together 16in. apart, and so braced that each piece would be firmly held. The front lower edge of the first and third pieces of scantling should be rounded in order that they would slip over the soil, but the second and fourth pieces should be left with sharp edges. The operator would ride on a plank thrown across the top, changing his position when necessary to make the leveller run straightly. With that implement, a sharp harrow and the soil grinder, a field might be put in condition for almost any crop. A handy garden roller might be made by filling a carbide tin with concrete, a piece of piping being run through the centre (with ends projecting some inches) before the concrete was put in, to afford a purchase for tackle or a handle to draw it. A good whitewash could be made as follows:—Fresh lime six parts, coarse salt two parts, alum one part. Dissolve the alum and salt in boiling water, slake the lime, and mix all together. Pass through a sieve to eliminate the lumps. The mixture should be of the consistency of ordinary paint, but if too thick water might be added. Three coats of that wash should be applied, allowing one day between each. It would remain good for some years. A cheap inside paint might be made from 8oz. freshly slaked lime mixed in an earthenware vessel with three quarts of sweet skimmed milk. In another vessel mix 3½lbs. of Paris white with three pints of skim milk. When these mixtures had been well stirred they should be mixed together and 6ozs. of linseed oil added. Mixed well the paint was then ready for use. A good glue could be made by soaking isinglass in spirits of wine and brandy for 24 hours. When open and mollified, the ingredients should be boiled together and kept stirred until well mixed. When a drop of it cooled, turned to a strong jelly, it should be strained through a linen cloth into a vessel to be kept closely stoppered. A gentle heat would dissolve the glue. A paintbrush which had become clogged might be restored by boiling in vinegar.

How to Solder.—A paper describing the process of soldering was read by Mr. W. E. Daddow, who said that the requisite tools comprised the following:—Soldering iron, file, salammoniac, spirits of salts, solder and brush. The soldering iron should taper to a point, and have smooth sides. When the iron was in good form it should be tinned. To do that it should be filed until it showed a clean copper face. If it changed color after filing it was too hot, and should be left to cool somewhat. The iron should then be rubbed on the salammoniac, some solder being melted on the iron whilst that was being done. If the iron were the right temperature it would become a bright silver color. After tinning the iron should not be heated too much or it would require tinning again. Good solder was never devoid of brightness on the side which did not touch the mould, unless it was of special quality, and then it would be white to cream in color. Solder which had a frosty appearance on the exposed side from end to end without any brightness was not good. It must have some part clean and bright. To test spirits of salts, if the fumes were inhaled by a deep breath without inconvenience, it was too dilute. In soldering galvanized iron the spirits of salts should be used full strength. Anything which contained zinc required the spirits in the raw state, but articles which contained no zinc required an addition of zinc to the spirits of salts, making what was known as killed spirits. In soldering tin plate either killed spirit or sperm candle might be used as a flux. In treating copper or brass killed spirits were best. For silverware resin or killed spirits should be used, but unless skilled in the art of soldering, silverware should not be touched, because silverware melted at so low a temperature that the soldering iron was likely to go through the metal. Killed spirits should be used for all malleable iron, but cast iron could not be soldered at all. Spirits should only be used on galvanized iron in the spots to be soldered because it corroded the iron. A good horsehair brush and a damp cloth were necessary in repair work, the former to apply the spirits, and the latter for wiping off. That operation, if performed two or three times before commencing to solder would result in better work. It was a mistake to use too much solder, but if the parts were clean and bright, and the right flux used, the soldering would be easily done. It was not practicable to solder over rust, nor would solder stick on a dirty surface. Salammoniac should only be used to tin the soldering iron, or to put in water in which the iron was dipped to clean it.

### NARRUNG (Average annual rainfall, 17in. to 18in.).

March 12th.—Present: nine members.

**Agricultural Education.**—In a paper on agricultural education Mr. J. Steer said that it was an erroneous idea held by many farmers that when their boys and girls could read and write and add up a few figures, they had received all the education necessary. Those who intended to follow the occupation of farmers needed a good education; one that did not end on leaving the primary school. The possession of a fifth-class certificate should not be the end of their education, but the beginning. To be fitted for what was to be his life's work the young farmer should be placed in a position to learn something about such subjects as veterinary work, sheep and woolclassing, the cultivation of fodder plots, the rearing of the pig, the curing of bacon, the erection of buildings, and he should have a knowledge of machinery and bookkeeping. Of course he would gain much information from practical experience, but that often proved expensive. Such experience would prove infinitely more valuable with a good foundation of education beneath it, such as could be secured by a course at the Agricultural College, where such subjects as agriculture, viticulture, dairying, veterinary science, bookkeeping, woolclassing, carpentering, blacksmithing, &c., might be studied. The education received by a boy in his association with the other students was a considerable item. Mr. Bottrill said that the practical farmer would teach his sons to avoid careless and slovenly methods. Mr. Bowyer remarked that a gift of observation was a considerable factor in the equipment of a successful farmer. The man who was on the lookout for good points knew them when he saw them and adopted them. That was the right kind of education, and such a man would know when to abandon an unprofitable and impracticable course of action. Mr. Lawson was of opinion that farmers did not avail themselves of the opportunities at hand, especially the Agricultural Bureau. He believed in boys receiving a college education. When it was ascertained that a boy was fitted to be a farmer he should be given the best opportunity of becoming an efficient farmer.

### PORT ELLIOT (Average annual rainfall, 20.33in.).

March 17th.—Present: seven members.

**Manuring Pasture Lands.**—In a paper on manuring pasture lands with artificial manures, Mr. James Chibnall said that the manuring of pasture lands had not been practised generally, though it had been tried on small patches as an experiment. Probably the difficulty had been the spreading of the manure. That could not be accomplished with a seed drill, because the drill sowed the manure in rows. He had found broadcasting the most satisfactory method, and it was not very hard work, because the worker was walking over hard ground. His experience was that super. gave the best results. It induced the clover to grow, and that added nitrogen to the soil and greatly improved the pastures, doubling their carrying capacity. Mr. H. Welch said that he had proved that manuring pasture land was most profitable. He had put mineral super. on eight or nine acres of light sandy soil in one paddock, and had more feed on that land than eight times the area of adjoining land of similar soil, which was not manured. Mr. McLeod said that he had tried salt and lime, and derived no benefit from it.

BLACKWOOD, February 19th.—Mr. C. G. Savage, manager of the Experimental Orchard at Coromandel Valley, read a paper on fruit drying and preserving, which was attentively listened to and appreciated.

CHERRY GARDENS, March 3rd.—A homestead meeting was held at the holding of Mr. S. W. Chapman. Discussion took place on the season, Mr. T. Jacobs drawing attention to an extraordinary growth of turnips, five weeks from planting seed, owing to the exceptional rains at short intervals. Mr. C. Ricks remarked on the excellent growth of grass, which should ensure good, early feed. Mr. S. W. Chapman noticed that apples on the protected portions of the trees were finer and cleaner than those on the outside or exposed to the weather. Mr. Chapman gave an exhibition of spraying with a power spray pump.

CHERRY GARDENS, March 6th.—Being exhibit night most of the members brought some sample of local production. Maize 8ft. high planted December 4th, 1916, was shown, and there were also some fine fruits and vegetables, including one potato weighing upwards of 3lbs.

CLARENDON, March 5th.—In a paper on the need for planting trees in South Australia, Mr. J. H. Dingle pointed out how the Moonta district had been denuded of timber for the use of the mines, and that now timber was scarce there. At Crystal Brook magnificent sugar gums had been grown, but pines had not flourished there owing to the ravages of the white ants. In the Clarendon district, however, Remarkable pines had done very well, and were valuable for the manufacture of fruit cases. If there was any spare land, no matter how rough, as long as a hole could be made to plant the trees, the Remarkable pine would pay. They should be planted in rows 16ft. apart, and the trees in the rows 8ft. apart, in order that they might be thinned out in three or four years. He would not plant gums or pines within 150ft. of the house, because they were dangerous in stormy weather, and filled the roof and guttering with their spines, &c. If a breakwind were required he would plant bamboos, one row, plants 2ft. apart, and in three years, if well looked after, they would form a close fence.

HARTLEY, February 7th.—The harvest returns were reported to be very favorable in that district. The medium and late variety wheats did best, but the early varieties lodged badly. Some of the best returns were as follows:—Yandilla King, 42bush.; Smut Proof, 30bush.; Scott's, 30bush.; Budd, 30bush.; Marshall's No. 3, 37bush.; and some lower, down to 7bush. Oats—Storm King, 36bush.; Cape oats, 12bush.; Champton Down, 9bush.; English barley, 30bush.; Cape barley, 40bush.; hay, 1 to 3 tons. Members estimated the average for the district at 20bush.

LONGWOOD, March 17th.—An inspection was made of the Mylor Typical Orchard, Mr. Tilling conducting members through the orchard and explaining the work which was in progress. At the conclusion a vote of thanks was tendered to Mr. Tilling. A resolution of appreciation of the work of Dr. Holtze in establishing the orchard was carried unanimously.

MACGILLIVRAY, March 6th.—A paper on grasses was read from the *Journal of Agriculture*, and a long discussion ensued on the suitability of various grasses for that district.

URAIDLA AND SUMMERTOWN, April 2nd.—A paper was read by Mr. W. H. Curtis entitled ''What is Irish Blight'' in which he described a number of diseases of the potato, which were often mistaken for, but were not, Irish blight. Mr. Cobbledick said he considered that the potatoes were planted too closely together in that district, and that helped disease to develop. Mr. E. Hawke considered that bluestone was a preventive of disease, and lime, when sown with the potato, was of great benefit in checking disease. Mr. J. Rowe had observed that potatoes sown in land which was not watered did not suffer so much from disease as those well watered. Potatoes planted in sheltered places were more liable to suffer from disease than those grown in the open. It was a mistake to use potato stalks for bedding for cattle, because it tended to develop disease when the manure was put on the land.

## SOUTH-EAST DISTRICT.

### KONGORONG.

April 3rd.—Present: 12 members and eight visitors.

Handfeeding Sheep.—The first essential in the handfeeding of sheep, declared Mr. A. C. Gust in a paper on that subject, was to obtain suitable feeders. Kerosine cases with the side knocked out and put on the top, so that the boxes would be on the flat, would make good feeders; far better than troughs, because the sheep had not room to stand in them. It was a mistake to have too many boxes, because they afforded too much room, and the sheep put their feet in the boxes, and dirtied their feed. One box to every eight or 10 sheep was sufficient, and then there would be room only for their heads. The best method of teaching them to eat their feed was to put them in a paddock where there was not too much feed, and then place a little chaff in the boxes and round the sheep up to them and hold them there for, say, a quarter of an hour and then move quietly away. Before many days they would rush the feed. Sheep should not be given more than they would eat at a time, because they wasted it, and the feed became stale. It might be questioned whether it would pay well at the present price of chaff to handfeed sheep, but, in his opinion it would pay better than selling it. If sheep were being kept to top up or fatten, while waiting for the fodder to grow, they should be fed on chaff, and when the green feed was ready they would require very little before they would be ready for market. Mr. E. E. Morrison had once fed some sheep from the screenings of the elevators in Canada, and they had done very well. He used a self-feeder and it did not kill any sheep. In feeding oats to sheep they should not be given too much at first. Mr. G. Wittey considered that crushed oats were the best for sheep. Mr. C. S. McLean said that chaff fed in a self-feeder in Victoria was successful. One of the best things for a man on a small holding was to handfeed sheep, especially if the market were slack. Mr. W. A. Aslin said that enough salt was not used for stock, especially at the present time of year. In answer to questions Mr. Gust said that he had tried feeding oats to sheep, but a few had died and he stopped it. He had about 600 sheep, and gave them six bags of chaff twice a day. Feeding with chaff would, he thought, do instead of change of pasture, and it would give the pasture a chance to freshen up.

### NARACOORTE (Average annual rainfall, 22.60in.).

March 10th.—Present: 25 members.

**Artificial Fertilisers on the Farm.**—Mr. S. H. Schinckel read a paper on artificial fertilisers for the farm; what to use, and how to use it. Of all the artificial fertilisers, he said, phosphoric acid was of the greatest importance, and then followed nitrogen and potash. Superphosphate was prepared by the action of sulphuric acid when using stones, bones, &c., for treatment. It was quite safe to say that superphosphate had given very good results on all agricultural land, particularly in the increased production of wheat. That had been done by using, on an average, about 60lbs. to 70lbs. per acre. Could they improve on that? That was a question every farmer should answer for himself, and all could do it by a little experimenting. From personal experience and observation he had found that 1cwt. of top grade super. per acre gave the best direct monetary returns, but he was also strongly of opinion that if farmers generally used 1½cwts. per acre that the extra cost would indirectly prove to be a very good investment, not because there would be a direct gain in the crop, but because of the marked improvement in the pasture that would follow. That was particularly noticeable in the increase of the clover family. They in turn added nitrogen to the soil, and further, the carrying capacity of the land was improved, more humus was supplied through herbage and droppings of stock, and when the land was again required for a cereal crop it should (other things being equal) be found in a better state of fertility. Some farmers considered that 1½cwts. per acre would be detrimental to wheat crops, but they must not forget that they were favored with a good rainfall, and phosphates were not leached out of the soil through excessive moisture, but were only taken from the soil by or through the growth of plants. What were the best phosphates? There were various brands, and every farmer had his own fancy. Personally he had failed to find much difference, so long as the phosphates contained the given quantity of phosphoric acid. But if the phosphates being used contained a fairly high percentage of sulphuric acid, they should be used early in the season—that was before the wet weather set in, otherwise the damp atmosphere acted on the sulphuric acid, and the super. when put into the drill, would very quickly become damp and difficult to handle, and cause a big strain on the works of the drill. Sulphuric acid did not in any other way interfere with the value of superphosphate. Nitrogen was a fertiliser which could be supplied to the soil through humus, leguminous plants or nitrate of soda. If the latter were used it should be used with care. Nitrogen, if used to excess, would cause rank and strong growth of flag and stem. Sometimes in wet winters the crops on the lower-lying grounds turned yellow. That was generally an indication that there was a deficiency of nitrogen. In such cases a top dressing of ½cwt. of nitrate of soda would generally give satisfactory results for a hay crop, but any excess of nitrogen might seriously affect the quality of it, causing too much growth in flag and stem at the sacrifice of grain. Potash as a fertiliser by itself was seldom used in that district, their agricultural lands, generally speaking, being fairly well supplied with it. It should, however, be found useful for some of the root crops and stone fruits. Lime was deficient in many of their soils. He could not claim that he had had any great benefits from its use, but he believed the time would come when they would find the liming of their soils to be a profitable undertaking. Lime was slow in action in the soil. In other parts of the world farmers regarded the liming of soils as one of first importance. Other valuable fertilisers were guano super., very useful, though not largely used in that district. Guano was the deposits of sea birds, and contained nearly all the ingredients of plant foods in certain quantities. It had given fairly satisfactory results when used. It also left a good effect upon the pasture. Bone super. had a more lasting effect upon the soil than superphosphate, but was not so quick in action. Artificial fertilisers were also very useful in the vegetable garden, but if farmers would take care of their farmyard manure there would be no need to worry about artificial manure for the garden. Mr. W. Loller said that superphosphates had proved of most benefit to the poorer soils, and thousands of acres of country had been cultivated which would not have been cultivated if it had not been for superphosphates. It was a great mistake to use lower grade manures, for the transit of them cost as much as the higher grades. It paid farmers to get the best manures. If they thought they were too strong for their land they could break them down with sand or some other ingredients, or use less per acre. It was to be regretted that so many farmers threw away a lot of manure. They should gather the manure and heap it up, place a layer of gypsum on it, then a layer of manure, and another layer of earth, and so on, and they would be surprised at the quantity of good manure they could get together. Mr. Alcock said the great advantage in using artificial fertilisers was to be seen in the lighter soils and in the dry districts of the State. It was marvellous the results that had been obtained from phosphatic manures in the lighter soils, and he need only refer to the Pinnaroo district, which had brought forth splendid crops of wheat with a remarkably low rainfall.

KALANGADOO, March 10th.—Mr. A. J. Haines read a short paper on feeding the dairy cow, which caused considerable discussion. Mr. M. Rogers said that he found Japanese millet a fine summer feed for cows. They were very fond of it, and did well on it. He sowed it in December.

KYBYBOLITE, March 29th.—Mr. W. J. Spafford (Superintendent of Experimental Work) delivered an address on tillage operations, dealing mainly with ploughing, formation of the seed bed, water conservation, tillage of the land in general, and practical methods pertaining thereto. An interesting discussion ensued.

MOUNT GAMBIER, March 10th.—The Hon. J. Botterill initiated a discussion on bush fires, and the best means of handling and preventing them. . When a fire broke out the best course was to get to the front of it and ascertain whether it were possible to prevent it going too far. If that were impossible the only course was to work up from the back. It was important to get as many men as were available to assist at the earliest moment. In heading a fire it was best to take advantage of some well used road and work back. It was a mistake for those engaged in suppressing a fire to work so hard that they were soon knocked out. In special times, if a house or stack were in danger, of course great efforts should be made, but the best way was to go on steadily and not overdo it. That was a point always to be borne in mind. The movement among the district councils to take up the formation of country fire brigades was a very wise one. Another important factor in extinguishing bush fires was the provision of water carts. They could do a tremendous amount of work with a little water, over a mile of fire having been put out with 200galls.atMoorak. A few beaters should be provided. With a properly made beater a man could work at a fire for hours without being exhausted. Mr. E. F. Crouch said that under the District Councils Act a council could appoint 10 people in different parts of the district to look after and supervise the beating out of bush fires, and it had also the right to spend any reasonable sums in equipping those people. Mr. H. G. Wheeler said that a man with a proper fire beater could do as much as five or six men equipped with boughs of trees and bags. Mr. Crouch condemned the two-wheeled water cart. They should have a four-wheeled wagonette or a German wagon.

MUNDALLA, March 14th.—Mr. A. H. Ormsby read a paper on preparing for seeding, in which he recommended that immediately after harvest the seed wheat should be cleaned ready for pickling. The implements should be overhauled. The best varieties of wheat to sow in that district were Federation, Silver King, and

**Yandilla King. As soon as the first rains fell about three-fourths of the wheat which it was intended to sow should be pickled, because that gave the seed time to dry well before sowing, and the probabilities of smut were minimised. About nine days after the rain, when the weeds had begun to show, the cultivator should be put upon the fallow about one day in advance of the drill. The drill should be kept close to the cultivator, because in case of rain it saved going over the soil again.**

## MANGE IN DOGS.

Mange as commonly found in dogs is of two varieties, each due to the rapid growth in or on the skin of mange mites or acari. One variety which causes intense itching is known as sarcoptic mange. The symptoms are small red patches, extending, which the dog continuously rubs; they may be on any part of the body, but generally commence on the head and ears and lower line. The skin is red and inflamed, and has small papules and vesicles not unlike those of eczema. The hair falls off and the skin becomes thickened and grey and scurfy. The disease spreads quickly, and in a few weeks the whole body may be involved, the dog becomes poor and miserable. Treatment, says the Veterinary Lecturer (Mr. F. E. Place, B.V.Sc., M.R.C.V.S.) demands the destruction of all bedding and the disinfection of sleeping places, otherwise a cure is impossible. A soda bath should be given, and when dry half the body should be dressed with a mixture of flowers of sulphur 4ozs., liquor potasse 2ozs., oil of tar 2ozs., and olive oil to a pint. In four days to a week he should have another soda bath, and the other half of the body should be dressed. A week later all the grease should be removed by another soda bath, and in most cases the dog will be cured.

The other form of mange is known as follicular, and occurs in two forms, pustular or squamous, *i.e.*, in mattery heads or scurfy scales. It generally begins round the eyes, and spreads to the face and forehead, it then appears on the feet and legs, especially inside the elbows, and gradually extends over the body. The first symptoms are patches of baldness, the skin is hot and purplish, with papules and pustules; as the patches increase in extent the skin thickens and puckers into folds, especially about the head, and there is a peculiar offensive smell, and the skin turns a slaty grey, cracks, and blood oozes, and often there is a dropsical swelling about the head. The dog seldom scratches, but shivers and shakes himself. For treatment a satisfactory dressing is a mixture of formalin 3 drams, glycerine 2ozs., methylated spirit 2ozs., oil of cloves 3 drams, olive oil 3ozs., almond oil 3ozs. This is applied daily, and there is a reddening and swelling of the skin; after a few dressings the pustules dry, become scaly, and disappear; the skin becomes soft and healthy. Sulphur ointment is then applied for a few times, and followed by a daily dressing of formalin ½dram, glycerine 1oz., tincture cantharides 1½ drams, salicylic acid ½ dram, methylated spirit 1 dram, almond oil 2ozs., olive oil 6ozs.

The hair begins to grow and the worst case is cured.

The squamous or scaly type is more generally found in small pets than in farm dogs, and requires less drastic but more persistent treatment.

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CLARENCE GOODE,

*Minister of Agriculture.*

# POINTS FOR PRODUCERS.

**Yacka Gum.**

In a letter of transmittal of Bulletin No. 6 of the Chemistry Department, the Director mentions that much time of the Department has been devoted to the economic products of grass trees, on account of the great extent of country covered by these trees, and the occupation by grass trees of land at present not found valuable for other purposes. The resin of the trees (yacka gum) appears likely to be of considerably greater commercial importance in the future. The present methods of collecting are wasteful, both of trees and resin, and it seems necessary to direct the attention of the public to the facts that the resin may be gathered without killing the trees, and that owing to the very slow growth of the grass trees they cannot readily be replaced by new trees, and a valuable asset to the State may be lost. Efforts should be made to preserve the trees as much as possible.

**Department of Chemistry Publications.**

From the Director of Chemistry (Mr. W. A. Hargreaves, M.A., D.Sc., B.C.E., F.I.C.) has been received a copy of Bulletin No. 5 of the Department of Chemistry. The Bulletin, on "Foaming of Boiler Waters," embodies the results of researches made by the Director into the causes of priming that takes place when attempts are made to use in locomotive boilers many of the natural waters of South Australia.

A copy of Bulletin No. 6, being a report of an investigation of the economic products of grass trees, by Mr. J. C. Earl, F.I.C., has also been received.

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**Statistics.**

The Government Statist (Mr. W. L. Johnston) has published, under the authority of the Chief Secretary (Hon. A. W. Styles, M.L.C.), the first issue of "The Statesman's Pocket Year Book of South Australia." This little volume contains a considerable amount of statistical and other matter, set out in a handy manner.

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**The Fox Pest.**

The necessity for concerted action on the part of landholders to destroy foxes was referred to at both the 1916 and 1917 conferences of the South-East Branches of the Agricultural Bureau, and it is quite apparent that this animal is a source of serious trouble to the sheep-breeder. The Advisory Board of Agriculture gave consideration to the matter at its meeting held on the 9th May. In the course of a discussion, Mr. A. M. Dawkins rather objected to the ordinary method of poisoning on the ground that it led to the destruction of so many useful native birds, particularly magpies. He thought a better plan would be to poison pigeons and various valueless small birds, which the foxes would take readily. The Director of Agriculture (Professor Perkins) pointed out that the distribution of a few baits of that character would not suffice. To obtain thoroughly satisfactory results it was necessary literally to sow the baits. When the latter course had been pursued at Roseworthy College between 80 and 90 dead foxes had been found, and no lambs had been lost. He admitted that magpies had been killed wholesale, but, so far as he was aware, they were the only useful birds that had been destroyed. This year, with the mice so numerous, it would be necessary to distribute the baits in hundreds. The Chief Inspector of Stock (Mr. T. H. Williams) directed attention to an important aspect of the poisoning policy, in which strychnine is almost invariably used. He explained that years ago an experiment was inaugurated in Europe with a view to ascertain how long the poison remained active in the bones of poisoned animals. Several different kinds of these, including monkeys, were employed, and it was found that in some instances the poison was still active after 14 years. Seeing that certain of the domesticated animals, particularly cows and pigs, were given to chewing bones, it was desirable that owners should reflect before engaging in wholesale poisoning with strychnine. There had been brought under his notice numerous cases in which cattle and pigs had died through eating carcasses of rabbits that had been poisoned months previously with the alkaloid named, and he considered that a large number of the deaths now regarded as more or less mysterious were really attributable to the same cause. After further discussion it was resolved, at the instance of Professor Perkins, to secure a report from the Director of the Department of Chemistry (Dr. W. A. Hargreaves).

### Worms in Pigs.

From time to time requests are received for direction as to the treatment of pigs affected with worms. The Veterinary Lecturer (Mr. F. E. Place, B.V.Sc., M.R.C.V.S.), in replying to a correspondent, stated that the worms described were known as *Ascaris suis*, and a heavy infestation, such as 104 in a pig, brought about a specific worm poisoning, as well as weakness arising from their utilising the food that the pig should absorb. General treatment consisted in always allowing cinders or large charcoal and some ashes to be in a box in the sty where the pigs could eat it at will, and also to put in the feed once a day for three or four days crushed castor oil beans at the rate of 1oz. per pig, the strong getting a little more, the weak a little less. Owing to the high cost of drugs it was often cheaper nowadays to use proprietary articles, such as worm tablets, rather than have special ones made up. For pigs of that age they should be used as for children of 5 to 7 years. If special powders were desired, the following might be used:—Santonin, 7grs.; calomel, ½dr.; areca, 1dr.; sugar, ½oz. That made one powder, and might be given to each pig in the morning fasting, food being given an hour or two later. Treatment was for three days, then stopped for 10 days, and repeated. For older pigs a cheaper powder, consisting of equal parts of sulphur, saltpetre, and charcoal, might be given at the rate of a flat tablespoon per day to each pig in food, and continued for a week or so. Pigs reinfested themselves from dung, so the sties needed to be kept clear, and no access to the dung heap allowed. If young pigs were not cleared of worms, all the profit was wasted in feeding the latter.

# INQUIRY DEPARTMENT.

**Any questions relating to methods of agriculture, horticulture, viticulture, dairying, &c., diseases of stock and poultry, insect and fungoid pests, the export of produce, and similar subjects, will be referred to the Government experts, and replies will be published in these pages for the benefit of producers generally. The name and address of the inquirer must accompany each question. Inquiries received from the question-boxes established by Branches of the Agricultural Bureau will be similarly dealt with. All correspondence should be addressed to "The Editor, *The Journal of Agriculture*, Adelaide."**

## VETERINARY INQUIRIES.

[Replies supplied by Mr. F. E. PLACE, B.V.Sc., M.R.C.V.S., Veterinary Lecturer.]

**[Extraordinary pressure on space has rendered it necessary to very considerably curtail the inquiry-department. Replies to those questions of more general interest only have been published; however, every query received has been replied to through the post.—ED.]**

"P. J. G.," Port Vincent, asks advice in regard to a bull to be dehorned.

Reply—Five months is too old to attempt to dehorn by solvents such as caustic potash according to the method often described in these replies. In this case a tenon saw must be used close to the skull. This will leave a hole that will have to be plugged with tar and tow until covered by the forelock. It is hardly advisable to dehorn if the bull is a valuable one, as the horns are necessary for character.

"C. W.," Whitwarta, has a cow with one quarter enlarged and black; rotten and sloughing.

Reply—This is not cancer, but black garget, a very severe form of mastitis, and after a month, as it is still getting worse, there is hardly any hope of recovery; but if treatment is to be tried, give 10 drops of tincture phytolacca every six hours internally, and bathe the quarter with 1oz. of the same in half a pint of olive oil made warm, at least three times a day, and in between keep up a marshmallow poultice to the quarter.

"F. D.," Mundoora, has a foal with bumble foot.

Reply—Little can be done to prevent further deformity, but the foot may be pared as near normal shape as possible, and a light shoe put on, which must be removed at least once a month. A slight blister round the coronet every three months may be of use.

"E. O. J. G.," Spalding, has a mare with supposed greasy heel.

Reply—Clean the heel thoroughly with petrol—do not wash with water; do this twice a week. Then dress with an ointment made of Venice turpentine 1 part, camphor 1 part, eucalyptus 1 part, lard 7 parts. Plaster this on thickly and cover with a bandage; renew each time the heel is cleaned until offensive discharge stops; then dress twice daily with white lotion made of ½oz. sulphate of zinc, ½oz. sugar of lead, ½ pint water, ½ pint methylated spirit.

"A. J. W.," K.I., has a cow with lump about size of goose egg on jaw, another on throat, which do not impede beast eating, and it has not lost condition. Supposed to be due to grass seeds.

Reply—The query is quoted in full, because the writer evidently is uneasy in his mind, and tries to soothe it by the grass seed suggestion. Grass seeds seldom affect two glands. The symptoms are highly suspicious of tuberculosis, and the law requires an owner of such a beast to isolate it and inform the Chief Inspector of Stock, Adelaide, of its condition. Therefore no treatment can be suggested until permitted by an officer of the Stock and Brands Department.

**"W. L.," Wynarka, is troubled with mice in underground tank.**

**Reply—As time does not permit of the tank being cleaned, it will be feasible to render the water potable for stock by the following means:—As the tank holds 15,000galls., take 15lbs. of alum, and put into a number of small bags, such as rolled oat bags; tie these to a board nearly as long as the tank is wide and tow the board up and down till all dissolved. A few hours later take 30lbs. of slaked lime, and repeat the process with it. This will precipitate matter in suspension, and it is very difficult for injurious organisms to exist in slime at the bottom of such a tank if the slime is not disturbed. Should there be an offensive smell, in addition to the above, dissolve 15lbs. of permanganate of potash, Condy's crystals, in a similar way.**

"W. L.," Wynarka, seeks treatment for horses affected with sore shoulders.

Reply—The mixture of 2ozs. white lead and 1 pint neatsfoot oil can be used with impunity, almost indefinitely, as absorption is hardly appreciable from the surface of the sore. The mixture is in constant use on the Government farms, and no bad results have ever occurred.

"C. Bros.," Penwortham, have a horse mopish, lies about, stretches out, arches neck in, has recently been put on mousey chaff.

Reply—The symptoms are not at all uncommon; they are those of mould and bloodworm poisoning, so often referred to. Give a five-dram physic ball, then, when that has ceased to scour, give twice daily for a week a tablespoon of Fowler's solution and a teaspoon of sulphate of quinine in food or mixed with a little honey and put in mouth. Of course stop the affected chaff, and put on bran or green feed only for the week.

"J. E. W.," Winninowie, has a mare with swelling in front of and on udder after weaning.

Reply—Such swellings are alarming, but not serious. When the udder is put out of action there is an amount of material to be removed by the lymphatics, and this is the swelling. Do not use turpentine, but the butter you have been using would do good. A satisfactory treatment generally is to give the mare a teaspoon of saltpetre in her food two or three times a day for a few days, and rub the udder twice a day with a mixture of half limewater and olive oil. Milking the mare when weaning is seldom necessary, except in special cases, and then only a little to relieve; it only prolongs the agony otherwise.

"J. V. H.," Mindarie, has a brown draught mare, 12 years, about and above the coronet skin very sore and bloody discharge oozes out; the hair sticks straight out and falls out; the discharge stinks and irritates, so that the beast stamps and bites the part. A peculiar rubbery substance forms where healing takes place; she seems better when working.

Reply—A very good description of the disease known as villitis, which is constitutional as well as local, and very difficult to eradicate. The feed, consisting of bran, cocky chaff, oats, and hay is all right, but the oats must be limited and the bowels kept open with bran. A tablespoon of Fowler's solution of arsenic should be given in the food twice daily for three weeks. Local treatment commences with two or three days' bran poulticing, this is followed by dressing twice a day with dilute acetic acid (3 per cent. strength); after a few days the part must be well plastered with Venice turpentine and camphor ointment, one of each to four of lard; after this has been on a few days it is cleaned off with petrol, and the acetic acid used again. This routine has to be kept up for months.

# SOUTH AUSTRALIA.—CEREAL AND HAY CROPS, 1916-17.

Wheat, 43,830,972bush. (average, 15.85bush.); barley, 1,839,692bush. (average, 16.99bush.); oats, 1,825,503bush. (average, 11.16bush.).

The preliminary results of the recent harvest have now been issued by the Government Statist (Mr. W. L. Johnston), who points out that as the statistical year for cereal, dairying, pastoral, horticultural, &c., production will in future end on June 30th, the annual collection by the police visiting the holdings cannot be made till that date. Special arrangements, however, were made to collect particulars of the cereal and hay crops through the post, but the results must be considered as preliminary until the annual collection referred to has been completed. It is not anticipated, however, that it will be necessary to materially revise the results now issued. For the purpose of the present estimate forms were supplied to 17,427 farmers, and replies received from 16,306. The results for the balance of 1,121 outstanding have been estimated. Of the total number 15,683 grew wheat, 4,337 barley, and 8,573 oats.

## WHEAT.

Of wheat, 3,121,574 (3,220,645) acres were sown, a decrease of 99,071 acres as compared with the previous season. The area was distributed as follows:—Grain, 2,765,383 acres; hay, 328,285 acres; fed off, 27,906 acres. It is estimated that 43,830,972 (34,134,504) bushels of wheat were reaped, an increase of 9,696,468bush. on the previous year; the average per acre being 15.85 (12.46) bushels, increase 3.39bush. per acre, and 2.59bush. greater than the previous highest average of 13.26bush. in 1909-10. The cut of hay, 443,583 tons, with an average of 1.35 tons per acre, shows a decrease of 310,933 tons on the record season, 1915-16, but was well up to the average cut.

## BARLEY.

The total yield of barley, 1,839,692bush., with an average of 16.99bush. per acre, exceeded the previous record season (1915-16) by 142,022bush. Of the total yield 1,375,419bush. were returned as malting.

## OATS.

1,825,503bush. were harvested, averaging 11.16bush. per acre. This is a decrease of 308,871bush., and 5.71bush. per acre on the record season, 1915-16. The cut of oaten hay, 172,521 tons, averaged 1.15 tons per acre, and though 119,546 tons below the record yield of 1915-16, is substantially greater than any previous cut.

## GENERAL.

There appears to be a great increase in the number of crops grown on shares. The harvesting weather was most unfavorable, and, combined with the shortage of bags and labor at critical periods, resulted in a considerable quantity of grain being spoiled in various parts of the State. Harvesting was not completed in late districts until the end of April.

# THE AGRICULTURAL BUREAU.

## CONFERENCE AT WAIKERIE.

The Murray River Branches of the Agricultural Bureau met in conference at Waikerie on May 14th and 15th, and the gathering ranks as one of the most successful and instructive conferences that has been held. Consideration was given to a number of questions of importance to irrigation settlements, and, as is usual, papers were read by members of the Branches, and addresses delivered by officers of the Department of Agriculture.

### THE DELEGATES.

Mr. Binks Williams, chairman of the Waikerie Branch, presided, and the following visiting delegates were present:—Kingston-on-Murray, Messrs. J. and W. J. Weatherall and J. E. Harrington; Murray Bridge, Messrs. R. S. Bell, J. Commyns, W. Fletcher, G. Lane, and E. Nelson; Mypolonga, Messrs. G. Horner, M. Rayner, and G. Wiadrowski; Ramco, Mr. J. G. Odgers; Renmark, Messrs. G. Agars, F. H. Basey, F. Cole, M. B. Geneste, F. Hooper, W. E. Muspratt, R. Nuttal, L. Pitt, H. S. Taylor, M. Tayler, and W. H. Waters; Berri, Messrs. W. Lewis, W. Padman, N. Cock, C. Harris, and C. Hounslow. In the absence of the Commissioner of Crown Lands (Hon. C. Goode), who was detained in Melbourne, Mr. G. Jeffrey (Vice-Chairman of the Advisory Board) represented the Department of Agriculture, and there were also present the Director of Agriculture (Professor A. J. Perkins), Mr. G. Quinn (Government Horticultural Instructor), and Mr. H. J. Finnis (Acting Secretary to the Advisory Board).

### WELCOMING THE VISITORS.

The Chairman, in his opening address, extended a cordial welcome to the visitors, and said that he was gratified to see so many present. Previous conferences had been very successful, and he was convinced that that would be a successful conference also. He regretted that the Commissioner of Crown Lands (Hon. C. Goode) was unable to be present, as he was delayed in Melbourne. The Director of Irrigation (Mr. S. McIntosh) had wired his regret that, owing to indisposition, he would be unable to attend the conference. He (the speaker) felt sure that their sympathies would go out to Mr. McIntosh, who was confined to his bed.

Mr. A. E. Ross, on behalf of the Waikerie District Council, said that he was pleased to welcome the visitors to their town. Personally he had felt that the importance of the Bureau had not been properly appreciated. But he was sure that these producers' parliaments were of greater value to the State than a great many people realized. Fortunately they had a good Department of Agriculture in the State. He urged that two matters which must be given attention were the increase in production, and the extension of their work in the direction which would lead them to become more efficient. He was convinced that conferences of the kind they were now holding could not but prove beneficial to the producers of the State.

Mr. J. G. Odgers (Ramco) thanked the Waikerie Branch for having given his Branch the privilege of extending a welcome to the visitors. The Ramco Branch was the oldest in the district, and with the exception of Renmark, he believed that the Ramco Branch of the Bureau was the oldest on the river. Mr. Odgers briefly traced the history of the district from the old village settlements to the present, and contended that the early settlements had caused the Governments to turn their attention to the advantages of settlement on the Murray River.

### PERTINENT POINTS.

Mr. G. Jeffrey (Vice-Chairman of the Advisory Board), in declaring the conference open, said that he desired to personally apologise for the absence of the Minister, who had been called to attend, with the Premier, at Melbourne, in connection with the wheat scheme. He referred to the fact that there were 190 Branches of the Bureau, representing 5,000 members, who were represented at the front by about 10 per cent. of their numbers. He urged members to do all they could, despite depleted numbers, to keep the Branches going until their comrades returned from the war with honors. He went on to speak of Major Johnston's report on the river, and touching on irrigation, said that though in dried fruits they had caught up to the demand, he was convinced that after the war such a new set of conditions would be evolved as would lead to a greater demand for their products. He was satisfied that in the near future there would be half a million people settled on the river, and by the system of preference, and the shutting out of their strongest competitors, there would be an unlimited market for their products. But they would have to increase their production, and pursue a vigorous policy by the adoption of other and more perfect systems of grading; and if they did that he was satisfied that there was a great and glorious future for the river settlements. South Australia was singularly fortunate in having in its agricultural department so excellent a staff, which was so well and capably led by Professor Perkins. (Applause.) He eulogised the Agricultural Bureau, and in conclusion stated that he was pleased to be present, and in declaring the conference open he wished the delegates every success, and a happy and prosperous future for the district.

### THE CODLIN MOTH.

Mr. Harrington (Kingston) said that the codlin moth had made its appearance on, he thought, all the holdings in Kingston, and as no settler there seemed to understand the matter, he asked for a discussion on the subject.

Mr. Quinn said that from now on the insect existed as a caterpillar in trees and in crevices of fruit boxes. It developed into a cocoon, and gradually developed as similar insects did, and in the blossom season the parent moth deposited eggs in the plants, which eventually became caterpillars, and entered the fruit. The remedy was to keep the trees clean, and to keep bandages of flannel, or even newspapers, round the trees, which enabled the grower to gather the caterpillars and destroy them. That was the old style; but now the arsenate of lead spray had been found most effective for the purpose of destroying the insects at the proper time, which was in the early stages of the caterpillar's life. The first spray should be given when the blossoms fell away from the tree; then a fortnight afterwards, and a third spraying a month or six weeks later. That was the method of dealing with codlin moth, and with four sprayings, where the work was properly done, the remedy was effective.

In reply to a question Mr. Quinn said that fruit which came into a fruit-growing district should be accompanied by a certificate of cleanliness. If a merely superficial examination of the fruit at the top of a case was made, it would not be effective, and even if every apple was examined it would not necessarily mean that the moth would be detected.

Mr. Goodchild said that until every person who had an odd tree or two was compelled to spray there would be trouble. There was the danger from old cases being used for various purposes.

Several speakers referred to the success of spraying operations, and Waikerie growers were advised to procure a plant on the cooperative principle which could be then used on every orchard. As far as Kingston was concerned the settlers were advised to take the trouble in hand at once, and if this were done it would be possible to keep the moth in check.

In reply to a question Mr. Quinn said that a late ripening fruit like the Rome Beauty required spraying at the end of January.

### Export of Pears.

Mr. F. H. Basey (Renmark) submitted the following resolution:—"That this conference of River Murray Branches of the Agricultural Bureau considers that in view of the large and growing acreage of pears planted on the river, the matter of the export of pears is a very important one, and desires to emphasize the necessity for the provision of more satisfactory refrigerating arrangements (which must be combined with self-registering thermometers) on the carrying steamers." In speaking to the motion, he said that pear export was a most important matter to men on the river. Some men had talked of pulling up their pear trees, but he was a believer in the exportation of pears, and his firm had successfully exported the fruit. They had realized 10s. per case in London, and it cost them 6s. per case to get the fruit to London. Other growers with more experience had received 15s. per case, and Victoria had done very well in shipping Duchess pears to London; consequently he did not see why South Australia should not make a success in the same direction. He understood that a lot depended on the ship's engineer in regard to keeping the pears at the requisite temperature on the steamers, and he held that the exporters should not be at the mercy of one man. The trouble was that while apple exportation had been proved profitable, the exportation of pears was still a speculation. It was certain that pears required to be kept at a lower temperature than apples. A "temperature clause" should be inserted in every bill of lading, and self-registering thermometers should be installed in the refrigerating chambers of the ships. The conference should show that it was convinced pears could be carried profitably to London, and by carrying the motion they would strengthen the hands of the Government.

Mr. W. Lewis (Berri), in seconding the motion, said that some growers in Berri had suggested pulling up their pears and planting currants. There should be some outlet for the pears, and if they could solve the question of export, all would be well, as there was no doubt that the fruit could be grown.

Mr. Quinn referred to a conference of growers in Melbourne, who had waited on the Minister for the Navy (Mr. Jensen), who had assured them that a clause would be included in the bills of lading of ships controlled by his department to provide for a temperature being kept at a degree which would be suitable for the fruit. There was a large market in Europe for the pear. Until the growers arranged for the cool storage of pears at the wharf, and the conveyance in properly constructed railway vans was provided for, there would always be doubt about the successful exportation of pears. They might rave at steamship companies, but there were faults to be remedied a little nearer home.

### CITRUS GROWERS' ASSOCIATION.

Mr. Cole (Renmark) moved—"That in the opinion of this conference the time has arrived when a citrus growers' association should be formed." Growers had been obtaining good prices for Washington navels, but the time was coming when they would not get these prices. He contended that there was a necessity for central packing sheds, where the fruit could be packed and graded systematically. An English firm had advised him that a better system of packing was necessary, and he held that they must take steps in the direction of keeping up the continuity of supplies to the overseas market with a certain number of cases of fruit, irrespective of the requirements of the local market. It was admitted that the properly graded and well-packed fruit commanded the highest prices.

Mr. Ross (Waikerie) seconded the motion, but urged that if they paid attention to the Australian market at present they would have enough to do. It had to be realized that they would have to be content to get 6s. per case for Washington navels at the orchard, and it should be arranged that river oranges could always be obtained in the market, and not have, as at present, a glut one week and nothing the next. The great thing was to regulate the supply in accordance with the demand. He thought the various settlements could get together and make arrangements to supply the markets and avoid gluts. A lot of money had been lost through haphazard systems having been followed, but when the increased quantities of oranges were available they would have to have system. If they did this, then he was satisfied that it would pay them to dispose of Washington navels at 6s. the case at the orchard.

The motion was carried unanimously.

Mr. Ross (Waikerie) moved—"That steps be taken in each irrigation settlement on the river to appoint committees to consider the formation of a citrus growers' association, to draw up suggestions and exchange views with one another, with a view to the organization of an association as early as possible; and, further, that the Renmark

Branch be requested to invite the co-operation of Curlwoa and Mildura.'' Mr. W. Lewis (Berri) seconded the motion, and urged that the committee should be formed at once. Mr. Cock (Berri), Mr. Waters (Renmark), and Mr. Taylor (Renmark) supported the motion. The motion was carried unanimously.

### A GREATER RANGE OF PRODUCE.

Mr. A. E. Ross (Waikerie) urged that steps be taken to look after the interests of growers in regard to the overseas markets in respect to dried fruits. With preference within the Empire, they would have a great market in Canada, England, and the other Dominions, and all they needed was a preference of a penny. Then there was the question of wine grapes, and he felt that there was a great future for the river settlements in this direction. If the Government erected wineries and leased them to the settlers, it would be well; but if the Government would not do that, the settlers would have to combine and provide them for themselves. Then there was the question of canning the fruit, for which there was a large and growing demand for the high-quality article for Sydney, Melbourne, and India. He did not think that dried apricots and peaches were attractive looking, and he preferred the properly canned article. He thought they would get good returns from tobacco growing. Another payable proposition was linseed, grown on the unirrigated sandy soils, which would grow the best linseed that could be produced. From the figures he had been given he was convinced that linseed raising was a better proposition for the small man than wheat. Canary seed was also a payable proposition, and he was informed that little expense was necessary beyond the ordinary implements of the farm.

Mr. Francis (Waikerie) moved—''That this conference respectfully requests the Government to experiment with lines now imported into Australia, such as linseed, canary seed, prunes, tobacco, and figs; such experiments to be carried out at Berri, under the supervision of the Renmark and Berri Branches, or at Mypolonga, under the supervision of the Murray Bridge and lower river Branches, on the same lines as wheat-growing tests are carried out at present.'' Mr. H. S. Taylor, in seconding the motion, said that cotton in small lots, linseed, and tobacco could be grown on the river. Mr. Shields (Renmark) said that he had experience in Glasgow of linseed which came from the Argentine, and was crushed and the oil used for cattle cake. They received from £17 to £58 a ton for the oil, but when it got to the higher prices the Japanese sent in Soya bean oil, which was largely used. He did not know whether they could grow the linseed and compete with Glasgow with the high rate of wages which ruled in Australia. The motion was agreed to.

### GOVERNMENT STEAMER WITH DAIRY PLANT.

Mr. W. Francis (Waikerie) moved—''That the Government be asked to take into consideration the question of providing a steamer fitted up with a butter-making plant, and also cool storage accommodation for butter, cheese, mutton, and pork.'' He said that sheep, lambs, and pigs could be slaughtered at the irrigation colonies and forwarded by such a steamer to townships along the Paringa, Loxton, Waikerie, and

Morgan railway lines. Settlers could deliver cream to the boat to be made into butter and forwarded to any part of the State. At present surplus butter has to be forwarded to the city and sold at pastry prices. In the district from Swan Reach to Mannum some years ago settlers were only receiving from 6d. to 8d. per lb. for their butter at the best. A steamer was put on by Captain Randell to run regular weekly trips, with a time table for each landing, and the settlers started forwarding their cream to city factories, and received from 1s. to 1s. 2d. per lb.; and during the dry nineties those settlers were able to make a living on their holdings, the extra 4d. to 6d. per lb. making a large increase in their weekly income. The Government were opening up a large area of fresh land for irrigation, and if facilities were provided, lucerne growing for dairying and lamb raising would pay well on the upper river.

Mr. F. H. Basey (Renmark) seconded the motion, which was agreed to.

### Canning and Jam Factory.

Mr. J. B. Murdoch (Waikerie) moved—"That the Government be asked to take into consideration the question of establishing canning, pulping, and jam factories along the river."

Mr. W. Francis (Waikerie) seconded the motion.

Mr. Beverley said there was a great deal to be said for the motion, as there was a great demand for canned fruit. He had for the last two years dealt with the apricot and pear crops by pulping.

Mr. A. E. Ross said the question of canning was out of the question this year, but if they could pulp the fruit so much the better.

The motion was carried unanimously.

### Manuring Orchards.

Mr. W. R. Lewis (Berri) introduced the question of manuring orchards.

Mr. Quinn said he had to confess that he knew little about the subject, but if they desired information relative to the various properties of different manures he could be of assistance to them. But he understood that was not what was required. At the experimental orchard at Blackwood manure plots had been conducted, and records had been made. Where superphosphate and bonedust had been used there had been increased growth in the trees, increased fruit yields, and a decrease in bitter pit in apples. But he urged that some patience must be observed, and they must wait until they had had, say, a dozen crops before they could arrive at any definite idea. In California the experiments indicated that there was nothing to equal old farmyard manure. He believed that the Government intended to give him the management of the experimental work at Berri, and he intended to carry out experiments in the direction of manuring. (Applause). He thought that the sandy soils were deficient in potash.

Mr. Waters (Renmark) said that as the result of placing manures (including gypsum) on a nine-acre plot of currants, he had increased the yield of currants from 5 tons to 18 tons.

Mr. Muspratt (Renmark) said that he usually used superphosphate, blood manure, and potash, and had obtained good results. The trouble had been for some time to get blood manure. The fruit that had had the benefit of potash would be found to weigh heavier than the fruit not so treated. He had had excellent results also with green manuring with peas. He planted a bushel and a half to the acre, and used a cwt. of superphosphate with them.

In reply to questions from Mypolonga, Mr. Quinn said that nitrogenous manures such as blood manures, or blood and bone, were useful to stimulate young trees. But if they could get sufficient farmyard manure, a barrowful to each tree might be used. In regard to two-year-old citrus trees, 1lb. to 2lbs. of the mixture he had mentioned was a suitable quantity, and the fertiliser could be applied in accordance with the irrigation periods. Spraying was effective against brown scale on citrus trees if used at the right time. The best time to spray was when the scale started to spread, and the presence of these pests was the best indication when to spray, as the pests seemed to breed and increase the year round. He did not think he could support the carrying out of manure tests on private blocks. During the past five years the average importation of dried fruits into South Australia was 16½ tons of prunes and 7½ tons of figs.

In reply to another question, Mr. Quinn said that he did not consider that black or brown scale was sufficiently serious to warrant fumigation. The spray pump was all that was necessary.

Mr. Muspratt said that when planting young orange trees he had always used a handful of bone super. He thought also that where, as at Mypolonga, they had to put cover crops in, that it was necessary to manure the second year. He thought that it was advisable before planting citrus trees to dip them in a weak kerosine emulsion.

In reply to a further question, Mr. Quinn advised growers to place back in the soil all the potash they could by the burning of cuttings and other matter taken out of the ground.

Mr. Quinn said they had five varieties of Capri figs, and at Blackwood and on the Adelaide Plains they found that the variety known as Podings No. 3, fulfilled all requirements. The trees would improve, and carry over the over-wintering figs, which contained the eggs of the wasps, which, as they developed, entered the heavy spring crop of figs and laid eggs, which developed into the insect about the time of the blossoming of the Smyrna figs, which only fruited once. He had Caprified all the varieties of figs, and was now raising seedlings. He thought there were other figs which would improve with drying as well as the Smyrna. He did not see why we should not grow drying figs, as the samples sent him by Mr. Allan had been as good as any imported dry fig he had seen.

It was resolved to hold the next conference at Berri in May, 1918.

# POTATO WILT.

## SOUTH-EASTERN CROP AFFECTED.

Professor T. G. B. Osborn, M.Sc., recently paid a visit to Mount Gambier and the surrounding district, for the purpose of examining the potato wilt, which was affecting the crops of the district. As a result of this visit, the Professor has supplied the following report to the Director of Agriculture:—

I have to report that, as requested, I visited Mount Gambier during the Easter recess to examine the potato wilt, specimens of which had been sent me by Orchard Inspector Fowler.

I found the site of the original outbreak to be three small contiguous plots, perhaps two or three acres altogether, situated at O.B. Flat. The disease was confined to one spot when first noticed some 14 days prior to my visit. On April 6th almost the whole area was affected.

Unfortunately shortly before my visit a sharp frost had damaged many of the potato tops in the district. It was not possible to determine whether all the dead tops observed were damaged by this wilt. I believe not, though a few suspicious plants were noted in a paddock about half a mile away from the original outbreak The frost had been severe upon the Departmental experimental plots at Mount Gambier, and nothing could be made out there.

On March 2nd last Mr. Alcock had sent me a wilted potato from Rendelsham, but the specimen arrived in the vacation, and was useless when received. He and Mr. Fowler were, therefore, anxious for me to visit Rendelsham, as I was in the district. On the 7th instant, then, in company of Messrs. Fowler and Alcock, I went to Millicent, and thence to Rendelsham and Mount Hope. At Rendelsham the frost had destroyed the tops completely, while the potato plots I saw at Mount Hope seemed free of the wilt. The visit, however, was very instructive, and I was greatly struck by the extraordinary growth of *Solanum nigrum* (local name "blackberry") upon the plots at Rendelsham. I have never seen any weed so thick. I understand that the local soil conditions are such that cultivation is impossible once the crop is in, so that a weed flourishes unchecked. But the luxuriant growth of such a perfectly useless weed must be detrimental to the area.

### SYMPTOMS OF WILT.

There is a sickly discoloration of the leaves, which later become flaccid. Subsequently the stem is involved, the main haulms standing erect, the rest of the aerial parts wilting and becoming brown.

### FUNGI.

Amongst the fungi present in the original specimens there was a copious growth of *Verticillium Albo-atrum.* It is considered to be a harmful pathogenic organism by American and German workers upon wilt fungi, though rather neglected by British pathologists. The symptoms are similar to those observed. After destroying the tops *Verticillium* passes into the vascular region of the tuber and hibernates there. No rot is produced, as by *Fusarium,* but there is a discoloration of the veins at the heel end. I collected several tubers with a discoloration at the vascular end. Amongst the other fungi present was an undetermined species of *Phoma.* This genus of fungi contains some very important parasites, but I know of no species attacking potatoes that produces such a wilt. Culture experiments upon these fungi are proceeding, upon which I will report later.

### CONCLUSIONS.

In concluding, I should like to state that though this disease is at present in an almost negligible amount, the damage that it has done is sufficient to show that serious results might be anticipated were it to spread. At present I know of no other outbreak. There is every reason to fear a spread if the tubers at O.B. Flat are used as seed. The crop will, no doubt, be marketable, but many small-sized tubers may be expected owing to the premature death of the tops. There may be an inclination to sell these for seed, and, in my opinion, it is desirable to prevent this.

It may be that another year, with a different rainfall, the disease will not manifest itself to the same degree. It is hardly safe to risk this. Wilt fungi are soil-infecting fungi, and the Americans, who have suffered severely from them, found them difficult to combat. It seems important, therefore, to check this wilt disease in as early stage as possible.

# PADDY MELON.

[By F. E. PLACE, B.V.Sc., M.R.C.V.S., Government Veterinary Lecturer.]

The name paddy melon is given to various melon-like plants in South Australia, but the one generally indicated is the small, rough-fruited one, *Cucumis myriocarpus.* The next most common one is a degenerate pie melon, *Citrullus vulgaris.*

Though horses and other stock are very fond of both fruit and vines, they are indigestible, on account of the hardness of the rind, seeds, and stems, which resist the gastric juice of the horse, and are passed into the small intestine in an unprepared condition when eaten in quantity. Here they set up violent irritation and produce pain and diarrhœa.

This is due to the violent action upon the muscles of the bowel coats by two glucosides contained in them, especially in the small one; these, colocynthin and elaterin, produce violent contractions of the bowels, often resulting in knotting and twisting of those organs. If the material is passed into the large bowels, these glucosides may be broken up, but the indigestible fibre soon brings about mechanical stoppage. Enteritis ensues in either case, and is followed by death.

A correspondent of logical mind inquires if the blindness attributable to paddy melon has ever been sheeted home to the plant; he also asks why cattle, which seem equally as fond as horses of the plant, do not suffer from eating it.

The answer lies in the recognition of certain physiological facts and chemical research. Such glucosides are in an ordinary way broken up in the macerating processes which occur in the ruminants' stomachs, and if not their action on the bowels is helpful in quickly removing the softened indigestible fibrous matter. So that the specific poisonous action is much modified.

The blindness has been experimentally produced by both colocynthin and elaterin, which, in addition to their irritating action on the mucous membrane of the bowels, have a similar action on that of the neighborhood of the eyes, and a specific irritating effect on the retina. Colocynthin, in addition, is known to produce opacity of the cornea and lens, and by one school of medicine is used in the latter condition in the human being. In India similar plants containing this toxic property are a frequent cause of blindness in young cattle.

Treatment is much more effective when of a preventive nature, that is when possible to have the stomach fairly full of digestible food, such as bran and chaff, before horses go on to the melons; but as this is not always possible, curative treatment has to be adopted, and brisk purging with aloes 6 drams to 8 drams, given as physic balls, has been found to have good effect. The action of the aloes is two-fold—aloin counteracts the other two glucosides, and hastens the evacuation of the bowels; but as these are in a very excitable condition, it is advisable to give sedatives as well, such as chlorodyne, or, better, chloroform in the way of spirits of chloroform, ½oz. to 1oz. This drug has a specific effect in breaking down the glucosides. In addition, local treatment may be adopted to the eyes in the early stages. This consists of a sedative lotion, such as belladonna or laudanum, used as fomentations frequently, or more readily the alkaloids atropine or morphia may be used as ophthalmic tabloids, inserted under the eyelids two or three times daily, till the acute symptoms have passed, and then the daily application of a lotion consisting of 2gr. of nitrate of silver to the ounce of distilled water, a few drops of the lotion being syringed into the eyes. An after course of 10 drops tr. nux vomica in a little honey on the tongue morning and evening for a week is beneficial.

# EXPERIMENTAL FARM HARVEST REPORTS.

By W. J. Spafford, Superintendent Experimental Work.

## 3.—BOOBOROWIE EXPERIMENTAL FARM.

Manager: Mr. F. E. Waddy.

This farm is situated 120 miles north of Adelaide, and contains 1,344 acres and has an altitude of 1,200ft. to 2,000ft. It consists of two blocks, one, the old North Booborowie homestead, is "high" land running to the highest point in Brown's Hill Range, and contains 1,046 acres; the other block (No. 478) contains 298 acres of comparatively level land, which, in times of heavy rains, is flooded by the Tumela Creek, and is two miles from the homestead. This farm is situated in the centre of a very good district, which contains land suitable for cereal-growing, lucerne-growing without artificial irrigation, and really good grazing land not arable. Unfortunately, this farm does not include any of the first-class lucerne-growing land, of which many thousands of acres are to be found in the district, and as the raising of lucerne under these conditions is as yet in its infancy, possibly useful experiments in this particular line are impossible to us for the want of some of this land.

### The Season 1916.

The year opened with but little rain, the first four months only producing 1.12in., while the average for the period at this farm is 2.71in. The scarcity of rain in the early part of the year was very soon made up, however, as May gave 1.62in., which is a little above the average, and this put the soil into good seeding condition; June yielded 4.01in., with the average at 2.55in.; July, 3.36in., against 1.96in.; and August 4.42in., when the average is but 1.95in. The period June-August totalled 11.79in., whereas the average for that period is only 6.46in.; and for the first eight months of the year 14.54in. were recorded, compared to 10.63in. average for the period. During September the rain eased, and only 1.86in. fell, whilst the average is 2.20in. This steadying up was a great advantage to crops, as in many places the land had been more or less waterlogged for three months, and it now had its chance to drain and become warm. During October and November a large amount of rain, comparatively to the average for these two months, fell, 4.42in. being recorded as against 2.72in. for the average. December also exceeded the average very considerably, and brought the total for the year up to 22.41in., whilst the average is but 16.42in., and not only was the total fall high, but 90 per cent. of it was "useful" rain (April-November), when the average percentage of "useful" to total rain at this farm is 84 per cent. The table following sets out in detail the monthly falls secured at this farm, together with the means since 1900:—

*Rainfall Distribution at Booborowie,* 1900-1916.

| | Means, 1900-1909. | 1910. | 1911. | 1912. | 1913. | 1914. | 1915. | 1916. | Means, 1900-1916. |
|---|---|---|---|---|---|---|---|---|---|
| | In. | In. | In. | In. | In. | In. | In. | In. | In. |
| January .......... | 0·55 | 0·33 | 0·38 | 0·19 | 0·06 | 0·21 | 0·49 | 0·31 | 0·44 |
| February ......... | 0·48 | 0·03 | 1·26 | 0·81 | 0·35 | 0·07 | — | 0·04 | 0·43 |
| March ............ | 0·52 | 4·00 | 0·73 | 0·67 | 2·96 | 0·11 | — | 0·19 | 0·82 |
| April ............ | 1·42 | — | 0·15 | 0·07 | 0·07 | 0·67 | 1·59 | 0·58 | 1·02 |
| May .............. | 1·49 | 1·84 | 2·20 | 0·21 | 0·27 | 1·34 | 2·37 | 1·63 | 1·46 |
| June ............. | 2·64 | 1·89 | 2·92 | 3·42 | 0·73 | 0·51 | 3·40 | 4·01 | 2·55 |
| July ............. | 1·92 | 3·13 | 2·10 | 2·11 | 0·83 | 1·13 | 1·56 | 3·36 | 1·96 |
| August ........... | 1·92 | 1·25 | 0·73 | 2·22 | 2·99 | 0·10 | 2·22 | 4·42 | 1·95 |
| September ........ | 2·06 | 4·37 | 1·59 | 1·89 | 3·32 | 0·45 | 3·34 | 1·86 | 2·20 |
| October .......... | 1·74 | 1·72 | 0·81 | 1·11 | 1·66 | 0·45 | 1·22 | 2·41 | 1·58 |
| November.......... | 0·95 | 1·08 | 0·24 | 2·17 | 0·99 | 3·14 | 0·25 | 2·01 | 1·14 |
| December ......... | 0·69 | 0·61 | 2·30 | 0·63 | 0·84 | 1·58 | 0·70 | 1·59 | 0·89 |
| Total ........ | 16·37 | 20·25 | 15·41 | 15·50 | 15·07 | 9·76 | 17·14 | 22·41 | 16·42 |
| Total "Useful" rain (April-November) | 14·14 | 15·28 | 10·74 | 13·20 | 10·86 | 7·79 | 15·95 | 20·28 | 13·85 |

### DISTRIBUTION OF "USEFUL" RAINFALL.

The total rain that falls in a year influences crops grown, but in this direction the "useful" rain (April to November) plays a greater part, and still more so does the distribution of this rain. For the purpose of clearly seeing the distribution of the "useful" rainfall, the season is divided into four periods—seeding, winter, spring, and early summer—and the rainfall for each of these periods shown. In the following table the distribution of the "useful" rainfall on the above plan will be found, together with the means since 1900:—

*Distribution of "Useful" Rainfall at Booborowie,* 1916, *with Means since* 1900.

| | 1916. | Means, 1900-1916. |
|---|---|---|
| | In. | In. |
| Seeding rains (April-May) .......... | 2.21 | 2.48 |
| Winter rains (June-July) .......... | 7.37 | 4.51 |
| Spring rains (August-October) ........ | 8.69 | 5.73 |
| Early summer rains (November) ...... | 2.01 | 1.14 |
| Total "Useful" rain .......... | 20.28 | 13.86 |

The above table shows seeding rains to be just about average at 2.21in.; the winter rains, with 7.37in., are much in excess of the average for the farm; so also are spring rains, with 8.69in. Provided that some rain falls in November, it is the quantity of rain distributed over the first three periods that mainly affects crops, so that big rains in early summer are not wanted. This year 2in. fell, as against the average of a little over 1in. With a rainfall distribution as shown at this farm, it would be almost impossible to get other than heavy crops with the ordinary South Australian farming practice. The seeding rains were good, and not too heavy, thus giving every chance to kill weeds, and to germinate well all seed put in during the period. The winter rains were on the heavy side, and consequently delayed seeding, but being plentiful, assured growth to crops in places not liable to becoming waterlogged. Spring rains were again heavy, and so safeguarded all late-sown crops, and tended generally to produce much growth. These spring rains were accompanied by exceptionally cool weather, and were followed by heavy early summer rains and more cool weather, with the result that all crops were very coarse and rank. This would have been all right had we experienced ordinary summer weather from then on; but it was not to be, for in December more rain fell, accompanied by cool weather and heavy winds, with the inevitable result on heavy crops—most of them lodged, some until they were flat, and others shelled their grain very badly. The continued rains and the cool weather delayed the ripening of all the varieties, and interfered with harvesting operations to such an extent that quite half of the grain of some varieties was lost through lodging and shelling. Despite the harvest troubles, the past season easily proved a record for this farm.

## CROPS.

Other than in the rotation experimental plots, and some mustard, the only crops grown consisted of the cereals, of which some were used for hay.

*Mustard.*—In field No. 5 about 16 acres were ploughed by July 6th and worked down, and on July 7th 5lbs. of white mustard seed was broadcasted to the acre and harrowed in. This crop, owing to the excessive wet and cold, did not make remarkable growth, and the whole area only carried sheep equivalent to 5,348 sheep-days, or 334¼ sheep-days to the acre, which is less than one sheep to the acre for the year—a very poor return for a sown crop.

*Hay Crops.*—Both wheat and oats were grown for hay. In field No. 1, which carried wheat in 1915, and which was ploughed and cultivated during May 10th to May 16th, and harrowed from May 13th to May 17th, a piece of the block was rolled on May 16th. Between May 13th and May 17th about 21 acres were drilled in with Calcutta oats—about 3 acres at 82lbs. seed per acre, and 18 acres at 75lbs. per acre—and 1cwt. superphosphate per acre. The whole of the area was harrowed after seeding.

The block of these oats was cut for hay, and the 21.17 acres cut produced 58 tons 4cwts., for an average of 2 tons 14cwts. 110lbs.

Part of field No. 8 (about 3½ acres) was ploughed in June, after having carried oats in 1915, cultivated, and harrowed immediately, then seeded with King's Red wheat, at the rate of 96lbs. seed and 1cwt. superphosphate per acre; the piece was then harrowed. The area cut for hay—3.60 acres—gave 9 tons, or an average of 2 tons 10cwts. per acre.

Some 13.16 acres of wheat headlands were cut, and produced 42 tons 10cwts., at an average of 3 tons 4cwts. 66lbs. to the acre. This made the total wheat cut 16.76 acres, which gave 51 tons 10cwts., for an average of 3 tons 1cwt. 51lbs. to the acre. The hay cut is shown in the following table:—

*Hay Cut, Booborowie,* 1916.

| | Area. | Total Yield. | | | Yield per Acre. | | |
|---|---|---|---|---|---|---|---|
| | Acres. | T. | C. | L. | T. | C. | L. |
| Oaten hay . . . . . . . . . | 21.17 | 58 | 4 | 0 | 2 | 14 | 110 |
| Wheaten hay . . . . . . . | 16.76 | 51 | 10 | 0 | 3 | 1 | 51 |
| Total hay cut . . . . . . | 37.93 | 109 | 14 | 0 | 2 | 17 | 94 |

The hay returns obtained at this farm have been kept since 1912, and in the table below these will be found, with the mean yield for the period 1912-1916:—

*Hay Returns, Booborowie,* 1912-1916.

| Year | Total Rainfall. | "Useful" Rainfall. | Area | Total Yield. | | | Yield per Acre. | | |
|---|---|---|---|---|---|---|---|---|---|
| | In. | In. | Acres. | T. | C. | L. | T. | C. | L. |
| 1912 . . . . . . | 15.50 | 13.20 | 70.00 | 132 | 5 | 0 | 1 | 18 | 88 |
| 1913 . . . . . . | 15.07 | 10.86 | 76.00 | 109 | 14 | 0 | 1 | 8 | 97 |
| 1914 . . . . . . | 9.76 | 7.79 | — | Failure | | | — | | |
| 1915 . . . . . . | 17.14 | 15.95 | 52.27 | 144 | 15 | 0 | 2 | 15 | 43 |
| 1916 . . . . . . | 22.41 | 20.28 | 37.93 | 109 | 14 | 0 | 2 | 17 | 94 |
| Means . . . | 15.98 | 13.62 | — | — | | | 1 | 16 | 20 |

*Oat Crops.*—The oats grown in field No. 1 were sown for the double purpose of cutting for hay or leaving for grain; as things turned out, the whole of it was cut for hay. This proceeding only left for grain oats that were sown on experimental plots. Of these, Scotch Grey oats from .875 acres yielded at the rate of 49bush. 21lbs., and Calcutta oats from 3.352 acres at the rate of 28bush. 20lbs. These together make a total of 138bush. 33lbs. harvested from 4.23 acres for an average yield of 32bush. 33lbs. to the acre.

The oat yields received at this farm since 1913 are to be found in the table below:—

*Oat Returns, Booborowie,* 1913-1916.

| Year. | Total Rainfall. In. | "Useful" Rainfall. In. | Area. Acres. | Total Yield. Bush. | Total Yield. lbs. | Yield per Acre. Bush. | Yield per Acre. lbs. |
|---|---|---|---|---|---|---|---|
| 1913 .......... | 15.07 | 10.86 | 54.00 | 1,394 | 13 | 32 | 11 |
| 1914 .......... | 9.76 | 7.79 | — | Failure | | — | |
| 1915 .......... | 17.14 | 15.95 | 75.47 | 2,410 | 20 | 31 | 38 |
| 1916 .......... | 22.41 | 20.28 | 4.23 | 138 | 33 | 32 | 33 |
| Means........ | 16.09 | 13.72 | — | — | | 24 | 10 |

*Barley Crops.*—Field No. 8 carried a crop of oats in 1915, and was ploughed from June 13th to June 19th, and harrowed from June 16th to June 19th in front of the drill. From June 16th to June 19th Cape barley was drilled in on 33½ acres of this field, at the rate of 60lbs. seed with 1cwt. superphosphate to the acre, and the whole block was immediately harrowed. Good weather was experienced whilst this field was being seeeded, and rain fell shortly after the operations were completed. Of this block 31.77 acres were harvested for grain, and produced 980bush. 10lbs., for an average of 30bush. 43lbs. per acre. Besides this block 4.155 acres of six-rowed barley were harvested for grain from experimental plots for a total yield of 139bush. 36lbs., and an average of 33bush. 31lbs. per acre. The total barley collected was 1,119bush. 46lbs. from 35.93 acres, and averaged 31bush. 8lbs. Last year (1915) was the first time that barley was grown for grain, and the following table shows the yields for the two seasons:—

*Barley Returns, Booboorowie,* 1915-1916.

| Year. | Total Rainfall. In. | "Useful" Rainfall. In. | Area. Acres. | Total Yield. Bush. | Total Yield. lbs. | Yield per Acre. Bush. | Yield per Acre. lbs. |
|---|---|---|---|---|---|---|---|
| 1915 ........ | 17.14 | 15.95 | 3.09 | 108 | 26 | 35 | 6 |
| 1916 ........ | 22.41 | 20.28 | 35.93 | 1,119 | 46 | 31 | 8 |
| Means .. | 19.77 | 18.11 | — | — | | 33 | 7 |

*Wheat Crops.*—A number of varieties of wheats were grown for grain this year, and in every case were sown on well-worked fallow land. The great majority of the wheats were grown in field No. 13, which carried its last crop of wheat in 1913, and was left in pasture in 1914. The ploughing of the field was done from July 16th to September 17th, 1915; it was cultivated from October 7th to October 19th; again from October 25th to November 5th; again from March 23rd to April 6th; and finally from May 25th to June 6th. The whole field was harrowed immediately after seeding the varieties with the drill, which was commenced on May 25th with Yandilla King, and completed on June 6th with King's Red. The seed used to the acre varied from 65lbs. to 76lbs., but all wheat was sown with 1cwt. superphosphate to the acre. The only two varieties grown under field conditions away from field No. 13 were Queen Fan and Onas. These were sown in field No. 7, which was ploughed in the period July 6th to July 15th; cultivated from September 24th to October 2nd; from November 1st to November 7th; and from May 23rd to June 8th. It was harrowed soon after first ploughed—from July 23rd to July 24th, and again straight after seeding operations. Part of the Queen Fan —about 10½ acres—was drilled in on May 24th, and the Onas and the remainder of the Queen Fan—about 14 acres—was seeded on June 9th, 1cwt. superphosphate to the acre being used in each case. The yields obtained from the wheat varieties is shown in the table following:—

*Wheat Variety Yields, Booborowie,* 1916.

| | Area. | Total Yield. | | Yield per Acre. | |
|---|---|---|---|---|---|
| | Acres. | Bush. | lbs. | Bush. | lbs. |
| Federation | 32.71 | 1,532 | 43 | 46 | 51 |
| Yandilla King | 34.25 | 1,259 | 25 | 36 | 46 |
| Onas (No. 7) | 1.15 | 41 | 17 | 35 | 54 |
| Marshall's No. 3 | 26.16 | 844 | 0 | 32 | 16 |
| Queen Fan (No. 7) | 21.34 | 657 | 36 | 30 | 49 |
| King's Red | 15.70 | 447 | 41 | 28 | 31 |
| Caliph | 2.78 | 76 | 48 | 27 | 38 |
| Bearded Gluyas | 6.62 | 173 | 3 | 26 | 8 |
| King's Red (Selection 7) | 2.80 | 69 | 51 | 24 | 57 |
| Queen Fan | 2.70 | 46 | 19 | 17 | 9 |
| Basil | 2.70 | 43 | 29 | 16 | 6 |
| Gluyas | 2.78 | 42 | 34 | 15 | 19 |
| College Eclipse | 2.60 | 33 | 28 | 12 | 52 |
| Late Gluyas | 3.04 | 38 | 21 | 12 | 37 |
| Totals | 157.33 | 5,306 | 35 | 33 | 44 |

The yields shown for the individual varieties is no criterion of how the varieties grew and the grain they produced, but was a very clear demonstration of how poor are our harvesting methods when we have good seasons. For instance, the Queen Fan grown in field No. 13 was much better in length of growth, individual plants, heads, and number of grains in the heads than the Queen Fan in No. 7, and the grain was at least of equal quality; yet the block grown in field No. 7, because it stood up a bit better than the other, yielded 30¾bush., whilst the better plot in every way gave only 17bush. This applies to all of the varieties more or less, and because of faulty harvesting methods the average yield of the varieties was 33¾bush., when it should have been at least 50bush. The above was so practically all over the State, and although the wheat average reached 15.85bush. to the acre, with better harvesting methods it would have been much nearer 25bush. to the acre.

To the above wheat must be added that obtained from the experimental plots, to show the farm average for wheat for the season, and this is set out below:—

*Wheat Average, Booborowie,* 1916.

| | Area. | Total Yield. | | Yield per Acre. | |
|---|---|---|---|---|---|
| | Acres. | Bush. | lbs. | Bush. | lbs. |
| Varieties | 157.33 | 5,306 | 35 | 33 | 44 |
| Experimental plots | 59.34 | 2,362 | 5 | 39 | 48 |
| Farm average | 216.67 | 7,668 | 40 | 35 | 24 |

This average yield of 35bush. 24lbs. is grand, considering the number of varieties grown, and is by a long way the record this farm has collected, being 8bush. higher than the previous record, obtained last year, and almost 14bush. above the farm average. The data leading to the farm average for wheat from 1912 is shown below in the next table:—

*Wheat Returns, Booborowie,* 1912-1916.

| Year. | Total Rainfall. | "Useful" Rainfall. | Area. | Total Yield. | | Yield per Acre. | |
|---|---|---|---|---|---|---|---|
| | In. | In. | Acres. | Bush. | lbs | Bush. | lbs. |
| 1912 | 15.50 | 13.20 | 180.00 | 4,645 | 20 | 25 | 48 |
| 1913 | 15.07 | 10.86 | 388.75 | 6,611 | 53 | 17 | 0 |
| 1914 | 9.76 | 7.79 | 339.75 | 990 | 58 | 2 | 55 |
| 1915 | 17.14 | 15.95 | 284.28 | 7,765 | 2 | 27 | 19 |
| 1916 | 22.41 | 20.28 | 216.67 | 7,668 | 40 | 35 | 24 |
| Means | 15.98 | 13.62 | — | — | | 21 | 41 |

The yields obtained from the various varieties have been kept since 1913, and in the following table the behaviour of the main varieties is set out:—

*Yields of Wheat Varieties, Booborowie,* 1913-1916.

| Varieties. | 1913. | | 1914. | | 1915. | | 1916. | | Means 1913-1916. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. |
| Federation | 26 | 53 | 3 | 43 | 33 | 33 | 46 | 51 | 27 | 45 |
| Yandilla King | 20 | 36 | 1 | 33 | 27 | 55 | 36 | 46 | 21 | 42 |
| King's Red | 21 | 49 | 2 | 34 | 28 | 44 | 27 | 58 | 20 | 16 |
| Marshall's No. 3 | 19 | 16 | 2 | 0 | 25 | 50 | 32 | 16 | 19 | 50 |
| Gluyas | 18 | 2 | 3 | 16 | 27 | 18 | 15 | 19 | 15 | 59 |
| Queen Fan | — | | — | | 35 | 46 | 29 | 17 | — | |
| Bearded Gluyas | — | | — | | 29 | 28 | 26 | 8 | — | |
| Farm averages | 17 | 0 | 2 | 55 | 27 | 19 | 35 | 24 | 20 | 39 |
| Total rainfall | 15.07in. | | 9.76in. | | 17.14in. | | 22.41in. | | 16.09in. | |
| "Useful" rainfall | 10.86in. | | 7.79in. | | 15.95in. | | 20.28in. | | 13.72in. | |

## EXPERIMENTAL PLOTS.

In 1915 a block of land was divided up into several series of rotation plots, and as only two crops have been grown on these plots, the returns are little more than yields of cereals with dressings of superphosphate. Below will be found the results obtained from these plots during 1915 and 1916:—

*Rotation Plots, Booborowie, 1915-1916.*

| Plot. | 1915 Treatment. | 1916 Treatment. | Wheat per Acre. | | Mean Yield per Acre. | |
|---|---|---|---|---|---|---|
| | | | B. | lbs. | B. | lbs. |
| | SERIES I. | | | | | |
| 1 | Bare fallow | Wheat: 2cwts. super. | 30 | 28 | — | |
| 2 | Wheat: 2cwts. super. | Bare fallow | 29 | 42 | 30 | 5 |
| | SERIES II. | | | | | |
| 3 | Sorghum | Wheat: 2cwts. super. | 31 | 20 | — | |
| 4 | Wheat: 2cwts. super. | Sorghum | 34 | 44 | 33 | 2 |
| | SERIES III. | | | | | |
| | A. | | | | | |
| 5 | Bare fallow | Wheat without manure | 28 | 45 | | |
| 6 | Wheat without manure | Pasture | 29 | 5 | | |
| 7 | Pasture | Bare fallow | — | | 28 | 55 |
| | B. | | | | | |
| 8 | Bare fallow | Wheat: ½cwt. super | 37 | 47 | | |
| 9 | Wheat: ½cwt. super. | Pasture | 37 | 9 | | |
| 10 | Pasture | Bare fallow | — | | 37 | 28 |
| | C. | | | | | |
| 11 | Bare fallow | Wheat: 1cwt. super. | 39 | 17 | | |
| 12 | Wheat: 1cwt. super. | Pasture | 38 | 51 | | |
| 13 | Pasture | Bare fallow | — | | 39 | 4 |
| | D. | | | | | |
| 14 | Bare fallow | Wheat: 2cwts. super. | 39 | 30 | | |
| 15 | Wheat: 2cwts. super. | Pasture | 37 | 6 | | |
| 16 | Pasture | Bare fallow | — | | 38 | 18 |
| | E. | | | | | |
| 17 | Bare fallow | Wheat: 3cwts. super. | 40 | 0 | | |
| 18 | Wheat: 3cwts. super. | Pasture | 39 | 40 | | |
| 19 | Pasture | Bare fallow | — | | 39 | 50 |
| | SERIES IV. | | | | | |
| | A. | | | | | |
| 20 | Bare fallow | Wheat: 2cwts. super. | 43 | 40 | | |
| 21 | Wheat: 2cwts. super. | Barley: 1cwt. super. | 37 | 37 | | |
| 22 | Barley: 1cwt. super. | Bare fallow | — | | 40 | 38 |
| | B. | | | | | |
| 23 | Bare fallow | Wheat: 2cwts. super. | 42 | 25 | | |
| 24 | Wheat: 2cwts. super. | Oats: 1cwt. super. | 34 | 0 | | |
| 25 | Oats: 1cwt. super. | Bare fallow | — | | 38 | 12 |
| | C. | | | | | |
| 26 | Bare fallow | Wheat: 2cwts. super. | 42 | 41 | | |
| 27 | Wheat: 2cwts. super. | Peas: 1cwt super. | 36 | 24 | | |
| 28 | Peas: 1cwt. super. | Bare fallow | — | | 39 | 32 |

## *Rotation Plots, Booborowie,* 1915-1916—continued.

| Plot. | 1915 Treatment. | 1916 Treatment. | Wheat per Acre. | | Mean Yield per Acre. | |
|---|---|---|---|---|---|---|
| | | | B. | lbs. | B. | lbs. |
| | SERIES IV. D. | | | | | |
| 29 | Bare fallow.............. | Wheat : 2cwts. super. .... | 44 | 54 | | |
| 30 | Wheat : 2cwts. super. .... | Rape : 1cwt. super. ...... | 31 | 52 | | |
| 31 | Rape : 1cwt. super. ...... | Bare fallow.............. | — | | 38 | 23 |
| | SERIES V. | | | | | |
| 32 | Bare fallow.............. | Wheat : 2cwts. super. .... | 44 | 47 | | |
| 33 | Wheat : 2cwts. super. .... | Bare fallow.............. | 34 | 52 | 39 | 49 |
| | SERIES VI. A. | | | | | |
| 34 | Bare fallow.............. | Wheat : 2cwts. super. .... | 49 | 5 | | |
| 35 | Wheat : 2cwts. super. .... | Barley : 2cwts. super. .... | 35 | 1 | | |
| 36 | Barley : 2cwts. super. .... | Pasture ................ | — | | | |
| 37 | Pasture ................ | Bare fallow.............. | — | | 42 | 3 |
| | B. | | | | | |
| 38 | Bare fallow.............. | Wheat : 2cwts. super. .... | 48 | 42 | | |
| 39 | Wheat : 2cwts. super. .... | Oats : 2cwts. super. ...... | 35 | 49 | | |
| 40 | Oats : 2cwts. super. ...... | Pasture ................ | — | | | |
| 41 | Pasture ................ | Bare fallow.............. | — | | 42 | 15 |
| | SERIES VII. | | | | | |
| 42 | Bare fallow.............. | Wheat and lucerne : 2cwts. super. | 33 | 47 | | |
| 43 | Wheat and lucerne : 2cwts. super. | Lucerne................. | 33 | 37 | | |
| 44 | Lucerne................. | Lucerne................. | — | | | |
| 45 | Lucerne................. | Lucerne................. | — | | | |
| 46 | Lucerne................. | Bare fallow.............. | — | | 33 | 42 |
| | SERIES VIII. | | | | | |
| 47 | Bare fallow.............. | Wheat and Rye Grass : 2cwts. super. | 47 | 30 | | |
| 48 | Wheat and Rye Grass : 2cwts. super. | Rye Grass.............. | 22 | 0 | | |
| 49 | Rye Grass.............. | Rye Grass.............. | — | | | |
| 50 | Rye Grass.............. | Bare fallow.............. | — | | 34 | 45 |

## *Crops other than Wheat in Rotation Plots.*

| | 1915. Yield per Acre. | | 1916. Yield per Acre. | | Mean Yield per Acre. | |
|---|---|---|---|---|---|---|
| | Bush. | lbs. | Bush. | lbs. | Bush. | lbs. |
| SERIES IV., A— | | | | | | |
| Barley : 1cwt. super............. | 27 | 47 | 26 | 27 | 27 | 12 |
| SERIES IV., B— | | | | | | |
| Oats : 1cwt. super. .............. | 31 | 9 | 33 | 23 | 32 | 16 |
| SERIES VI., A— | | | | | | |
| Barley : 2cwts. super. ........... | 41 | 7 | 34 | 16 | 37 | 36 |
| SERIES VI., B. | | | | | | |
| Oats : 2cwts. super.............. | 40 | 20 | 23 | 5 | 31 | 32 |

SERIES IV. C.—

Peas; 1cwt. superphosphate. In 1915 this crop was harvested for grain, and produced 12bush. 42lbs. to the acre, but in 1916 it was fed off by sheep, with the following result:—From December 11th to 22nd a flock of 146 ewes were on plot, and the same flock again from December 25th to 27th, making a total of 1,898 sheep-days for an area of 1.7214 acres, which equals 3.02 sheep per acre for 365 days.

SERIES IV. D.—

Rape; 1cwt superphosphate. Both in 1915 and 1916 this crop was fed down by sheep, with the following results:—

1915—From October 5th to 13th, 100 sheep; October 16th to 22nd, 507 sheep; December 15th to 17th, 350 sheep, which together equals 4,542 sheep-days for 1.7214 acres, or a carrying capacity of 7.23 sheep to the acre for a year.

1916—From October 28th to November 3rd, 240 sheep; December 9th to 15th, 100 sheep; December 29th to January 2nd, 12 sheep, together equalling 2,088 sheep-days for an area of 1.7214 acres, or 3.32 sheep to the acre for the year.

SERIES VII.—

Wheat with lucerne and 2cwts. superphosphate. The grazing of the plot sown as above in 1915 was done at one period with a flock of 110 sheep, from November 7th to 18th, which is 1,210 sheep-days on 1.6912 acres, and is equivalent to 1.96 sheep per acre for the year.

SERIES VIII.—

Wheat with rye grass and 2cwts. superphosphate. The grazing of the plot sown as above in 1915 was as follows:—50 sheep from October 5th to 7th; 200 sheep from October 9th to 10th; 150 sheep from October 17th to 19th; 110 sheep from November 3rd to 4th, making a total of 710 sheep-days on 1.6912 acres, and equal to 1.15 sheep per acre for the year.

*Seed in Rotation Plots*, 1916.

| | |
|---|---|
| Wheat—Federation | 75lbs per acre |
| Barley—Cape | 58lbs. per acre |
| Oats—Calcutta | 75lbs. per acre |
| Peas—Early Dun | 100lbs. per acre |
| Rape—Dwarf Essex | 4½lbs. per acre |
| Lucerne—Hunter River | 6lbs. per acre |
| Rye Grass—Italian | 9lbs. per acre |
| Sorghum—Early Amber Cane | 7lbs. per acre |

## PERMANENT MANURIAL PLOTS, BOOBOROWIE, 1916.

In 1915 a set of permanent manurial plots were surveyed, so that the experiments will be conducted on the bare fallow-wheat system, and one part was worked as bare fallow that year and cropped this year, whilst the other portion was bare-fallowed in 1916. Federation wheat was used in all cases, and the results obtained, although only for a single season, are comparable one with the other for the particular conditions that obtained.

| Plot. | Manuring per Acre. | Grain per Acre. | |
|---|---|---|---|
| | | Bush. | lbs. |
| 1. | ½cwt. superphosphate | 36 | 58 |
| 2. | 1cwt. superphosphate | 38 | 57 |
| 3. | 2cwts. superphosphate | 39 | 3 |
| 4. | 3cwts. superphosphate | 38 | 0 |
| 5. | No manure | 32 | 58 |
| 6. | 1cwt. superphosphate, ½cwt. nitrate of soda (spring) | 40 | 18 |
| 7. | 2cwts. superphosphate, ½cwt. nitrate of soda (spring) | 40 | 50 |

### PERMANENT MANURIAL PLOTS, BOOBOROWIE, 1916—*continued.*

| Plot. | Manuring per Acre. | Grain per Acre. Bush. | lbs. |
|---|---|---|---|
| 8. | 1cwt. superphosphate, ½cwt. sulphate of ammonia (seeding) | 41 | 25 |
| 9. | 2cwts. superphosphate, ½cwt. sulphate of ammonia (seeding) | 38 | 11 |
| 10. | 1cwt. superphosphate, ½cwt. sulphate of potash (seeding) | 40 | 50 |
| 11. | 2cwts. superphosphate, ½cwt. sulphate of potash (seeding) | 44 | 1 |
| 12. | 2cwts. superphosphate, ½cwt. sulphate of potash (seeding), ½cwt. nitrate of soda (spring) | 40 | 34 |
| 13. | 1cwt. superphosphate | 40 | 11 |
| 14. | No manure | 40 | 9 |
| 15. | 1cwt. basic slag | 41 | 55 |
| 16. | 2cwts. basic slag | 42 | 23 |
| 17. | 10 tons farmyard manure | 40 | 7 |
| 18. | 10 tons farmyard manure, 2cwts. superphosphate | 41 | 44 |
| 19. | 10 tons farmyard manure, 2cwts. superphosphate, ½cwt. sulphate of potash | 42 | 5 |
| 20. | 2cwts. superphosphate, 4cwts. gypsum | 41 | 8 |
| 21. | 2cwts. superphosphate, 5cwts. lime | 45 | 58 |
| 22. | 2cwts. superphosphate (half at ploughing) | 40 | 40 |
| 23. | 2cwts. superphosphate (half at ploughing), ½cwt. nitrate of soda | 41 | 31 |

### PERMANENT CULTIVATION PLOTS, BOOBOROWIE, 1916.

In 1915 a series of cultivation plots, having as their object different methods of treating bare fallow, were commenced, and they carried their first crops in 1916. They are worked on bare fallow-wheat system, and received 2cwts. superphosphate to the acre. This season they all carried Federation wheat, with the following results:—

| Plot. | Treatment. | Yield per Acre. Bush. | lbs. |
|---|---|---|---|
| | *Early Fallow (June-July).* | | |
| 24. | Ploughed 6in. deep and harrowed within a few days. Cultivated or harrowed whenever weeds or a crust render necessary | 40 | 48 |
| 25. | Ploughed 6in. deep and left rough throughout the winter. Cultivated or harrowed whenever weeds or a crust render necessary | 41 | 4 |
| 26. | Ploughed 6in. deep and rolled within a few days, and cultivated or harrowed according to circumstances. Cultivated or harrowed whenever weeds or a crust render necessary | 33 | 25 |
| 27. | Ploughed 6in. deep and skim ploughed after first rain. Cultivated or harrowed whenever weeds or a crust render necessary | 41 | 1 |
| | *Late Fallow (September).* | | |
| 28. | Ploughed 3in. deep and cultivated according to requirements, but not rolled | 35 | 38 |
| 29. | Ploughed 6in. deep and heavily rolled the same day as ploughed. Cultivated according to requirements | 37 | 45 |
| | *Autumn Ploughing (March or April).* | | |
| 30. | Not bare-fallowed, but ploughed 4in. deep and immediately rolled. Cultivated according to requirements | 35 | 49 |

### PERMANENT DEPTH OF PLOUGHING PLOTS, BOOBOROWIE, 1916.

Besides the above series of cultivation plots, a further series of depth of ploughing plots was started at the same time, on the bare fallow-wheat system, using 2cwts. superphosphate to the acre with the crop. The first crop was grown in 1916, and Federation wheat was used throughout the series.

| Plot. | Depth of Ploughing. | Yield per Acre. Bush. | lbs. |
|---|---|---|---|
| 31. | Ploughed 3in. deep | 40 | 2 |
| 32. | Ploughed 6in. deep | 37 | 26 |
| 33. | Ploughed 9in. deep | 33 | 54 |
| 34. | Ploughed 9in. deep (to be then twice ploughed 3in. before again being ploughed 9in.) | 33 | 44 |

### CULTIVATION OF GROWING CEREALS EXPERIMENT.

In these experimental plots the cereals wheat, oats, and barley were drilled in rows 21in. apart, and the strips between the rows were kept loose and free from weeds by cultivation. Account was kept of all work done, and the time occupied by each operation, so that the extra cost of the working over and above ordinary farm methods can be found.

### CULTIVATION OF "ROSEWORTHY" WHEAT.

"Roseworthy" wheat was drilled into 1 acre of land in rows 21in. apart; 11lbs. of seed were used to the acre, and 2cwts. superphosphate. This acre plot received two horse-hoeings, one taking 2½ hours and the other 2 hours 20 minutes to do, and hand weeding by one lad for 27 hours. The wheat yielded 31bush. 57lbs. for an extra cost of 16s. 4d. for the acre, arrived at as follows:—1 horse for 1 day, 2s. 6d.; 1 man for 1 day, 9s.; 1 lad for 8 hours, 4s.; less 49lbs. seed at 1d. per lb.

### CULTIVATION OF "SCOTCH GREY" OATS.

"Scotch Grey" oats were drilled into 1 acre of land in rows 21in. apart; 12lbs. of seed were used to the acre, and 2cwts. of superphosphate. This acre plot received two horse-hoeings, one taking 2½ hours and the other 2 hours 10 minutes to do; but no hand-hoeing was found to be necessary. The oats yielded at the rate of 49bush. 21lbs. to the acre for an extra cost of 2s. 8d., worked out on the same basis as above, but being less 48lbs. seed.

### CULTIVATION OF "SHORT HEAD" BARLEY.

"Short Head" barley was drilled into 1 acre of land in rows 21in. apart; 12lbs. of seed were used to the acre, and 2cwts. superphosphate. This acre plot received two horse-hoeings, one taking 2 hours 20 minutes and the other 2 hours 45 minutes; but no hand-hoeing was necessary.

The barley produced 41bush. 36lbs. to the acre for an extra cost of 3s. 4d., worked out on the same basis as for the wheat, but with an allowance for 48lbs. seed saved.

Unfortunately not enough seed of the particular varieties was obtainable at the time to grow check plots of them under ordinary farm conditions. This fault will be corrected in the coming season; but as we were in a position to start these plots, although with a limited amount of seed, we decided it would be better to get them going, instead of losing a year's results.

### GENERAL.

The manager of the farm (Mr. F. E. Waddy), in his report, states that several heavy frosts, with hot days, occurred during October; but these changed to damp, thundery conditions, and the only noticeable damage done by the frost was to the plot of sorghum, which was cut to the ground and did not recover. The land being in good condition, the crops came away nicely, and made splendid growth throughout the year, and the good spring rains caused the heads to fill well, with the resulting good yield. The yield would have been much higher if all of the wheat could have been gathered, but the rough, stormy weather during the summer knocked the crops about badly; much wheat was shaken out, and a large proportion could not be picked up by the harvesting machines. The fodder crops, rape and peas, made splendid growth; the rape made a poor start, but had wholly recovered by the end of the winter.

# FRUIT TREES.

## THE PRINCIPLES OF PRUNING.

The Horticultural Instructor (Mr. Geo. Quinn), at a recent conference of the River Murray Branches of the Agricultural Bureau, delivered an address on the principles of pruning fruit trees.

It was stated that every man had his own methods of pruning, he said, and Professor Bailey had written that no system of pruning could be said to be wholly wrong, and that no system could be claimed to be entirely right. There were two recognised systems of pruning and training trees, the European and the American. These were two very diverse methods, but so far as they were concerned they could not adopt either of them on account of the cost of labor and the distance from the world's markets. The orchard was the best place to demonstrate pruning, but it was wise at times to resort to the lecture room and there discuss the philosophy of the subject. The idea of pruning was to increase the size and quality of the fruit, to maintain regular crops over a long period, and to accomplish these aims upon economic lines, and he wished to emphasise not to lose the economic side of the question. The commercial side had to be considered. What might be called the philosophy of pruning could be summed up in the accumulated observations of the behaviour of plants when subjected to certain operative treatments under known conditions of soil and climate.

### THE BASIC PRINCIPLES.

What were the basic principles of pruning? They were founded on a knowledge of certain laws, or effects which almost invariably occurred in the growth of plants. They might summarise them under five points:—(1) The value of foliage to the plant, (2) the advantages accruing to a vertical position, (3) the natural balance between roots and branches, (4) the vigor of vegetation versus fruit production, (5) that large numbers of fruit were incompatible with fine size and quality. Taking the foliage of the trees, it had to be remembered that that was almost equal in value to the stomach and lungs of an animal, and the health and vigor of the tree depended on the spread of healthy foliage on it. Then there were the advantages which accrued to the upright branches which all tended to grow stronger. That was always taken advantage of in pruning, and was a point that could not be lost sight of in the training of the vine. By distributing the principal branches of vines on a trellis a better distribution of the sap was obtained to all parts. The same practice was applied in connection with the growth of apples, in which the weaker trees were trained towards the upright position and the stronger ones in an oblique direction. The relation of the upper parts of the tree to the roots had to be considered, and much trouble had been observed in the Adelaide hills from not recognising the balance between the upper part and the roots of the trees. In planting young trees they had to remember that the gardener in uprooting the trees from the nursery had probably left two-thirds of the roots in the ground, hence they always cut back the upper portion of the tree after planting. Much vigor of vegetation in a growing plant was usually opposed to a prolific fruiting habit. By means of summer pruning the plant material building facilities were restricted by removing some of the foliage. Hence its effects were deemed conducive to fruit bearing. A large number of fruits was incompatible with large size and good quality, and by thinning off by hand as was done in Europe, a reduction was effected but an increased size obtained. Here we lessened the number of the fruits by cutting off fruit bearing spurs, which thus also tended to increase the size of the fruit. Summer pruning devitalised the tree, and if persisted in to a great extent would ultimately kill the tree, whereas winter pruning, in conjunction with other operations, would tend to strengthen the trees, more particularly in certain desirable directions. They could not compare the cutting away of tree limbs with the cutting off of limbs of an animal, as an animal could not grow another limb.

### The Reason for Pruning.

Why was pruning done at all, it might be asked? Pruning was done to modify the form of the tree to meet economic needs, and to counteract unfavorable climatic conditions, to reduce or stimulate the production of wood growth or fruit bearing as the case demanded, and to remove injured or worn-out parts of the tree. In modifying the form of our fruiting plants we were gradually evolving a type of tree and grapevine adapted to our own conditions. The hotter and the more exposed the position the shorter should they have the stem, so they preferred to have a short stem with stout limbs, and thereby bring the fruit within easy reach, and to shade the ground and protect the tree from high winds. They appeared to be following a slightly different system of pruning on the Murray to that adopted in other parts of Australia. They had erred in the past in the direction which induced trees to produce wood. They should know that by too vigorous a growth they got less fruit, and it became necessary to stunt the tree to obtain blossom and fruit. But if that went too far they had to apply such methods to it as would cause it to grow again. That was what all pruning operations aimed at—the building of the tree so that it would prove of the greatest commercial use. The removal of, and the renewing of worn out parts of trees was given less attention than others. Wounds in trees were frequently seen that were not healing on account of the cuts being in a wrong position. It required no more care to make a cut in the right direction and cleanly than it did to hack off a limb. He urged growers to use sharper and better adapted implements for their pruning operations.

### Practical Suggestions.

In the case of spur fruiting types of deciduous trees we had the apple, pear, and plum, and the peach, apricot, and nectarine might be called shoot fruiting trees. In dealing with deciduous trees for the first two or three years the treatment was practically the same, to get a short, stiff trunk from which branches should radiate. Thus they were pruned hard for a few years. It was not necessary, assuming they had a good framework, to keep on cutting, year after year, at the leading shoots. Even in England the length of the shoot varied in regard to what had grown from the last pruning, and what was allowed to remain. The topping of the leader to a dormant bud would tend to draw an undue amount of sap, and the result would be that, as someone had remarked, one might go on growing prune trees for many years and get no prunes. Assuming that a decent framework had been first obtained and it became necessary to cut back, it was not a difficult matter to prune the tree so as to get it to its normal condition. It was found that the quality of the fruit of the prune tree would deteriorate if they allowed it to become a mass of subdivided laterals. Unless some pruning was done the quality of the fruit declined, and the profit of the grower was consequently reduced. If they could so regulate the trees as to get away from the heavy and light cropping years they would do a great deal. The winter before the heavy crop was anticipated the thinning out should be carried into effect, and not the year before the light crop. That would prevent the tree making undue growth and enable it to return a reasonable amount of fruit and so keep the tree in some form of regularity of growth and bearing. On the river they could get a quicker return than on the colder areas, as the result of the stronger growth induced by increased sun heat. Under such conditions they should prune young trees for two years, and the third year they should be less manipulated with the pruning knife. If they did not desire to let the trees grow weaker they should cut them back again in subsequent years.

### "THE UNSTOPPED LEADER."

He had in the different settlements found a different interpretation of what was termed the "unstopped" leaders. In some settlements he had seen trees with four spindly limbs each of which was growing heavenwards with all its vigor. If in their early years those trees had been cut for another winter or two they would have had more limbs and would have filled up the spaces which would tend to make the trees more profitable. He felt that the uncut leader was a good idea if applied intelligently. If they left the weak branch uncut and expected to get the same return as from a strong branch uncut, they were deceiving themselves. When the top of a leading shoot was cut to a single dormant bud the first rush of sap was to that bud, or the dormant buds round about received the benefit. If they turned that leader on to a weaker shoot they got as near as they could to prevent the sap going to the stronger shoots to the detriment of the spurs or laterals. In regard to the terminal point there might come a time when they could not permit it to grow vertically. When the trees were becoming retarded to the extent of stunting the fruit they found that it was necessary to cut them back and thereby restore their vigor.

Mr. H. S. Taylor said that he had no desire to criticise Mr. Quinn. He was perfectly satisfied with the unstopped leader, but he was aware that it was a matter which required careful consideration. He was satisfied that Mr. Quinn was right when he urged that it was necessary to prune trees for the first two years.

Mr. Ross said that the tendency seemed to be that the head of the tree became callous, and he thought that under ordinary circumstances it was necessary to move the tree every third year.

Mr. Basey said it was not so much the cutting back of the leader as the turning of it back to the lateral.

# SWINE FEVER.

## ITS CAUSE AND TREATMENT.

The Government Veterinary Lecturer (Mr. F. E. Place, B.V.Sc., M.R.C.V.S.), replying to a correspondent who inquired for information as to the symptoms of and treatment for swine fever, states that swine fever, the hog cholera of America, is a specific contagious intestinal fever of swine, having many conditions similar to typhoid fever in man. It is attended by congestion, exudation, blood extravasation, and ulceration of the mucous membrane of the throat, stomach, and bowels, by liquid foetid diarrhœa, by general heat and redness of the surface, and by the appearance on the skin of spots and patches of a scarlet or purple color, and a scaly rash on the thighs and legs. It is either fatal in one to six days, or ends in a slow uncertain recovery. The fatalities are commonest in young pigs of a few months, the so-called recoveries in older pigs resulting in their being "carriers," as in human typhoid. The evacuations emit a very peculiar characteristic odor, very reminiscent of human typhoid.

### SYMPTOMS.

Incubation ranges from a week to two in cold weather to three days in warm. It is followed by shivering, dullness, weakness, hiding under litter (very characteristic), unwillingness to rise, hot dry snout, sunken eyes, unsteady gait behind, little or no appetite, great thirst, fever. The skin is hot and sore, and red or purple patches appear, especially behind the ears, elbows, on thighs; the patches lose their color if pressed, but the spots do not. The tongue is thickly furred, and the squeal weak and hoarse. Breathing quick, with a hard dry cough. The animals may vomit and grunt or squeal if the belly is handled, the bowels may be costive throughout, but more commonly they become relaxed about the third day, and an exhausting foetid diarrhœa ensues, slime and blood may pass with the dung. The pig loses control of the hind limbs, and is often quite stupid, with muscular trembling, jerking, and involuntary emission of dung and urine.

### CAUSES.

It is due to microbes so small that they are not to be seen even with a most powerful microscope, and hence called ultravisible. But faults in feeding and management help to bring it about. The microbes may be blown half a mile by the wind, and carried by dogs, birds, rats, and especially on boots of attendants or visitors, who should be rigorously excluded from the premises or made to disinfect their boots before leaving. It is very difficult to destroy in sties, bedding, &c., fire being the only reliable means of so doing.

### TREATMENT.

Treatment is not permissible in South Australia, and the owner of suspected pigs is required by the Stock Diseases Act, under severe penalties, to at once isolate such animals, and give immediate notice to the Chief Inspector of Stock, Adelaide, and the nearest inspector to the premises. It is the height of folly to attempt to evade these regulations, as the immediate detection of the disease is the only way of effectually checking it, and the symptoms are so varied, and in many cases so slight, that only the trained eye can detect them. Delay in reporting may lead to a large outbreak, which in the present promising state of pig breeding would lead to disaster. Delay is unneighborly and worse than a crime; it is foolish in the extreme. The officers of the Stock Department do not go about seeking to discover swine fever where it does not exist; they are only too delighted to find a call proves a false alarm. In America, Holland, and Austria preventive and curative treatment is carried out by means of sera under qualified veterinary surgeons, and the same course has been very successfully tentatively adopted in Great Britain. The administration of calomel in 15-grain to 60-grain doses assists; this latter may be given before the inspector arrives, and a few drops of sulphuric acid may be added to fresh, cool drinking water.

### Prevention.

The pig is the cleanest and most sanitary of all domesticated animals when given a fair chance, and all newly bought pigs should be placed at a safe distance in quarantine for three weeks until their good health is proved. Food should be clean and good; cinders, charcoal, or slag should always be available for pigs, and an occasional ounce of photographers' hypo. in their slop will do good. If at all costive, give sulphur in their feed; from a teaspoon to a dessertspoon daily for a few days is advisable.

Should a pig show any of the above symptoms, isolate it at once, and kill it if decided symptoms set in.

Kill and bury in lime and disinfectants all diseased ones, and watch survivors for any symptoms that may develop. Thoroughly disinfect all material they may have come in contact with, and avoid all suspected food, places, or even water that has run near a diseased herd.

Remember the provisions of the Stock Diseases Act and your duty under it.

The Veterinary Lecturer is an officer of the Agricultural Department, not of the Stock Department, and though he is always ready to offer advice, fatal delay may arise if you fail to immediately inform the Chief Inspector of Stock, Adelaide.

Swine fever can be kept out of South Australia, and the way to do it is to co-operate heartily with the Stock Department, whose officers are your friends, and more anxious to keep your pigs free from disease than many pigowners; it is of no monetary advantage to them, while concealment may mean the ruination of an industry that is likely to be one of the farmers' best assets.

# SPRAY IRRIGATION.

## EXPERIENCE AT PYAP.

Mr. G. Beverley (manager of the Pyap Estate, and a member of the Loxton Branch), at the recent Conference of River Murray Branches of the Agricultural Bureau contributed the following paper, giving the results of his experience with a system of spraying for irrigation purposes, which had been installed at Pyap. The paper read—

After over 20 years of practical work with irrigation of various methods, I can confidently recommend spray irrigation as superior to any I have had experience with.

In the first place the great benefit derived by the use of the spray system since its installation at the Pyap Estate has been amply demonstrated by its use on a citrus patch planted on a high slope of land which formerly was watered only by the furrow system of irrigation, with the result that in irrigating by the latter method the trees were after three years from the time of planting no larger or better grown than trees that have only been 12 months planted and have been watered with the spray irrigation. Two patches of citrus planted at the same time on opposite sides of the road, were chosen as giving a good chance to fully demonstrate the advantages claimed for this spray system over the furrow irrigation. Both pieces of land were on a slope of the same grade, the soil was exactly similar, and the variety of citrus planted, viz., navel orange on Seville stock, were chosen as giving a perfectly equal chance to demonstrate both sides of this question. After 18 months' use of the spray on the one patch before mentioned the trees had gained fully two years' growth over those watered by the old method, which were very little better than they were 18 months previously. The spray patch, although it had been watered with water that was very salty, owing to the low river prevailing at the time, still showed healthy growth, and was carrying a good crop of oranges, while the other patch was yellow and sickly, and did not show a single fruit.

### SPECIAL ADVANTAGES CLAIMED.

The beneficial result is easily explained by the fact that the spray system takes only one-sixth of the water required, and gives a better result than the larger quantities used by furrow irrigation, consequently, the furrow method gave a considerable deposit of salt to the roots of the trees, hence their sickly appearance. The principal advantages of the spray system are:—(1) Economy in water, only one-sixth of the water used by the furrow system being required to give a better result, for the reason that there is little or no evaporation as in open channels, and unless the channels are concrete lined there is also the great loss by soakage to contend with. (2) The water distributed in the form of a fine mist pre-cools the atmosphere, so that the spray may be used on even young and delicate trees with impunity during the hottest part of the day. (3) The water is evenly distributed over the whole surface of the land and no flooding is caused. (4) By the spray system it is possible to bring into cultivation land of so steep a grade that it would be impossible to water by any other means, and thus hundreds of acres along the river of splendid land, too steep in the grade, or undulating, to be irrigated by ordinary methods could be sown with lucerne and watered by the spray system with gratifying results to the owners.

## Economy of the System.

It is claimed by those who deprecate this system that the initial cost is too high, but I am sure that, if everything was taken into account, the installation from the start of the spray system would compare favorably with the old furrow or flooding methods on these grounds: (1) Economy in the size of the pump required. (2) Entire saving of the grading of the land, which necessitates the removing of the best top soil and placing it on the top of already rich soil, to the detriment of the land from which it was removed. (3) Even distribution of water. (4) Entire absence of flooding, so annoying to settlers who have depressions in their land which hold the water, thus often preventing the prompt cultivation of the land, so necessary to insure good healthy growth. (5) The spray system is the nearest approach to natural rainfall that it is possible to obtain, and I think that no one will deny that any trees grown under natural conditions will be healthier than those grown otherwise.

The leaves and limbs of the trees are washed free of dust, and the bark is kept from becoming hidebound, as it often does in trees that are checked or stunted in their growth. In the case of manure having been applied to any patch of land the water falling in the shape of rain, leaches the manure through the soil, dissolving it gradually, whereas the furrow system will, in many cases, especially on sandy soil, wash the top soil and manure to the bottom of the rows of trees or vines, thus giving the plants at the lower end of the slope a larger share than is required, while those at the top end are often deprived of the manure they need. This is entirely obviated by watering with an evenly distributing spray.

## Lucerne Growing.

With respect to lucerne grown under the spray, I cannot give much data on this, as the 16 acres that were sown to lucerne on the estate were flooded out by the high river, with the exception of a patch about one acre in extent. This patch, sown on October 12th, 1916, gave four cuttings of lucerne up to the end of March, 1917, and a fifth cutting when about a foot high was eaten down by sheep. It is claimed, however, by those who have installed the spray system for lucerne that two more cuttings per annum can be reckoned on than on patches that are flooded, but of this I cannot speak with authority. There is also to be borne in mind the saving in land occupied by channels; and the cost of concreting same, and the saving in the cost of labor for watering.

# THE DRYING OF FRUIT.

## METHODS ADOPTED ON MURRAY SETTLEMENTS.

After dealing briefly with the history of the fruit-drying industry, Mr. W. R. Lewis, of the Berri Branch, in a paper read before the Murray River Branches of the Agricultural Bureau Conference, stated that the drying of fruit might be summed up in three words—evaporation by heat. "Of the best method of applying that heat," the paper continued, "very much might be said. Some may advocate an evaporator, where the drying may be accomplished in a very short time. Of these drying kilns or evaporators, quite a variety exist, and some good fruit has been so dried; but they require a considerable amount of attention, and on the whole do not turn out a fruit equal to the sun-dried article. So I think, at least as far as this valley of the Murray is concerned, except in special seasons, we may dismiss the evaporator as not being the best for our purpose. The outfit first introduced by the Chaffey Bros. was, so far as stone fruit was concerned, a quantity of wooden trays, 3ft. by 2ft., with sulphur boxes or houses, according to quantity of fruit to be handled. Since then alterations have taken place in the size of trays used, but the principle remains the same. In dealing with the fruit of the vine, however, alterations of considerable importance have been made. In the earlier days practically the whole of the fruit was dried on the small wooden trays. Now we see large racks composed of netted wire and timber being used, and it is safe to say that by far the larger portion of currants, with considerable quantities of sultanas and Gordos, are now dried upon racks and wire trays. Now, upon drying matters, perhaps if I start with the apricot and just outline the procedure, it may be of some service to those who have had practically no experience.

### PRELIMINARY WORK.

"In selecting your drying ground, you have a number of factors to take into consideration; among others, convenience of working and liability to dust have to be considered. Do not underrate the dust, for many a sample of fruit, otherwise good, is seriously damaged by dust. For apricot drying, I certainly prefer a closely cut lucerne plot; it may dry a little slower than bare earth, but the dust trouble is reduced. Two sulphur boxes, or more if you have a large quantity to handle, and a sufficient quantity of trays are required. The fruit must be ripe or you cannot get a good color. It should not be too soft to handle, but quite ripe. Cut clean round your fruit, not halfway, otherwise you force the stone out; if you do, you have a ragged edge that will look bad when dried, and also in sulphuring you will be liable to lose juice set free by the action of sulphur, and juice running on to your trays is, of course wasted; and so you lose in weight and in appearance. Place your cut fruit on the tray as evenly as possible, and do not allow it to list, or you may lose juice by this. Do not expose the cut fruit to the hot sun before sulphuring—keep it covered. Place it in the sulphur box and sulphur for at least four hours—all night will not hurt it unless the weather is particularly hot. Make sure that your sulphur is well alight before closing down. It is a good plan to have a small opening at the top of the box to allow the escape of air until well alight, when it can be closed. About 2lbs. of sulphur should do 100 small trays; but I would not stint sulphur, as it is not likely to do any injury, and it fixes the color, and appearance tells in the selling of dried fruit as well as it does in fresh. The time on the drying ground is, of course, governed by the weather, but if the heat reached, say, above 95deg. in the shade, I would stack and finish off in the shade. If the picking is done by your own family, you may arrange to do most of your grading in the orchard whilst picking, as it saves time on the drying ground—a matter of expense if you are employing labor.

### CARE NEEDED.

"Apricots, to be dried whole, require to be well sulphured; care is needed in putting them out, as they have a tendency to blister if placed in the sun at too great a temperature. It must be borne in mind that whole apricots will take very much longer than cut ones to dry, so if you have a shortage of trays, you will not gain much by trying whole apricots; but if you have the material, it is a way of disposing of a lot of fruit in quick time, but I do not recommend it. The method of treating peaches and nectarines is similar. Goldmine nectarines may be safely dried whole, and I fancy retain their flavor better when so done; but I could not recommend the drying of peaches whole. A tendency to mould round the stone seems to be the chief trouble. Sulphur whole nectarines heavily. Some American authorities, in dealing with peaches, sulphur them for one hour. This loosens the outer skin, which is then removed. The peaches are then re-sulphured to fix the color, then dried in the ordinary method; and it is in California that they should know something of peach drying. Before dealing with the currants, I should like to say a few words about the prune and fig.

### PRUNE GROWING.

"So far we have not had much to encourage us to go in for prune growing. But the fact that some men are making the prune pay ought to encourage us to at least keep on experimenting, if only on a small scale. The prune is a most popular fruit, and vast quantities are yearly consumed. In our own colonies quantities are imported, and I certainy think we ought to be able to stop this. Some fine samples of prunes are yearly grown by Mr. Faulkner, of Mildura, whose method of procedure may be worth noting. He claims that his best results are obtained by pricking, and when nearly dry, plunging into boiling water, to wash the fruit clean; then immediately dip in a light syrup, then for a few hours spread on trays to dry, when they are ready for packing. In California the prunes are usually shaken from the trees. On the drying ground they are placed in dipping trays, immersed in boiling lye for 5 seconds to 10 seconds, or until the skins crack. The strength of the lye should be 1lb. to 10galls. of water. The prunes are lifted from the boiling lye anl tipped into a draining board, after which they pass to a board, which has sharp-pointed needles standing up about one-eighth of an inch. These needles prick the skin, allowing the moisture to escape more readily whilst the fruit is drying. The pricking boards are arranged with sufficient slope to allow fruit to roll to receiving tins or trays. Fruit usually takes about five days to seven days in good weather. Silver prunes are sulphured before being placed in the sun to dry. California yearly exports vast quantities of prunes, as high as 174,000,000lbs. in a season. In the Santa Clara Valley alone there are upwards of 4,000,000 French prune trees, and over 1,000,000 silver prunes. The valley of the Murray will be a changed locality when we grow prunes on such a scale. I have successfully dried a small quantity of prunes (Fellemberg) for a number of years, and the quality and flavor has been excellent.

### THE FIG.

"Another fruit that Australia imports is the fig, and it ought not to be. Fig growing was one of the early industries of California, and the white Adriatic was extensively planted, but it was not until the introduction of the Smyrna fig and the Capri wasp that the industry was placed on a safe financial footing. The quantity dried is now running into millions of pounds per annum. The method of drying the Smyrna or Calimyrna, as it is known in the United States, is to allow the fruit to partially dry on the trees, then shake it off. This falling from the trees extends over a period of about six weeks. The fruit is dipped for about half a minute in a boiling solution containing 3oz. of salt to every gallon of water. The fruit is then spread on trays and placed in the sun. About the second day it is turned. Four days is generally sufficient to dry figs. You must be careful not to overdry, as the skins toughen. They should have a leathery feel when worked between the thumb and finger. They should be collected from trays as soon as dry and placed in sweat boxes, as sweating will soften the skin. Figs when ready for packing are again dipped in 4oz. salt to the gallon and drained for a few hours, then steamed to kill grubs, &c.; but I have used the packing dip, the second one, hot, which answered the purpose, as the fruit kept well after this treatment. There can be no doubt about the ready market for dried figs, and as the Smyrna fig and Capri wasp have been successfully introduced, this is one of the lines we should supply, and not trust to imports.

### THE PEAR.

"The pear is also a fruit that we have to deal with to a certain extent in the dried state. In Australia we have not gone in extensively for this fruit, probably Messrs. Basey and Howie, of Renmark, are the largest of our river driers. They believe that it is probable that this fruit may be overdone, as far as drying alone is concerned, and they have carried out some experiments in the hope of establishing an export trade that would place this line on a good footing. The dried pear is certainly very nice, and of good appearance, and should, if kept on the market, create a demand. The fruit can be picked when quiet firm, just changing color, placed in sweats, and cut as they ripen. Cut in halves, they are sulphured and dried. Good weather is essential, as if bad weather ensues, loss is fairly sure to occur. Given preserving works or direct railway connection, a large quantity of pears could be disposed of. In California a pack amounting to 14,000,000lbs. per annum is disposed of.

### THE ZANTE CURRANT.

"The currants are the simplest of all fruits to deal with, but yet only last season a friend of mine gathered his crop at such a stage that he succeeded in producing a very light, sour currant from what, if allowed to ripen properly, would have turned out a fair sample. Ripeness is the main point. If the fruit is perfectly ripe, and it is dried in the shade, most persons obtain a fair sample. Care must be taken in picking, and the fruit placed on wire racks or trays. If the day is not very hot, a few hours in the sun will not hurt, and will quicken the drying, but currants must be dried in stacks. I think the wire rack the best method of dealing with currants—once it is on the rack, if roofed, you have your fruit under control, and hessian side curtains will enable you to shade your fruit as desired. The class of rack is a matter every man must please himself about, but if I might advise, after seeing a good number, I would advise 6ft. netting. The greater width can be managed all right, and very little extra timber will be required for 6ft. than for 4ft. 6in.

### SULTANAS.

"In picking sultanas be sure that the fruit is quite ripe, if not you will lose in weight. Last year I advised a dip of about 1lb. of caustic to 18galls. to 20galls. of water. If I should advise now, I would extend the quantity of water from 18galls. to 21galls. I know that there are some who recommend a much stronger dip, but I have never succeeded in getting a good sample at a stronger rate, but I have produced fine samples at 1lb. to 25galls. A great deal depends on the quality of your fruit. If ripe and crisp, with tender skins, not exposed to too much direct sun, a lye of 1 to 25 is strong enough; on the other hand, if slightly wilted, 1 in 15 might not be too strong. You do not need to split the grape, only slight cracks are needed. A great deal depends on the judgment of the man operating at the dip, for sultanas only need plunging in the lye, regulating the time by heat and strength of lye. I have not used a thermometer, but to a new hand I think it might be a help. Experienced men judge by the appearance of grapes as they emerge from the dip. Spread the fruit on the trays lightly, and the same on the racks. About eight days' good weather will generally do sultanas. I have dried them in four days, but that is too quick, and has a tendency to harden the skin. If too slow in drying the color deteriorates. Sultanas can be dried on racks or trays, but will stand more sun than currants. Sultanas require sweating.

### GORDOS.

"The Gordo, from which we obtain the Lexia of commerce, grows to perfection on the Murray, and splendid samples of raisins have been produced year after year. But when we overtook the Commonwealth requirements, the price became so low that the Gordo fell into disfavor; but with the advent of the distillery it partially regained its former place. In drying, a stronger lye is needed, about 1lb. to 8galls. of water being most in favor. That Lexias of fine quality can be produced on this river there can be no question, but all persons planting these vines must make up their minds to have a portion of their crop passed on to the distillery. Where one is situated in the district, and your fruit can be carted in a fresh state, it simplifies the matter; but in such cases it might pay best to plant Doradillo. The advantage in the Gordos is that they produce a fine Lexia, a good distilling grape, and with the White Muscat of Alexandria form the principal source of our table raisins. I have had some experience in drying table raisins, and where a man can attend to it himself it might pay to dry some. Only the very finest bunches should be used, and remember you cannot cart them in in boxes and spread on trays on your drying ground. The bunches must be carefully cut, handled only by the stem, and defective berries must be cut out, holding the bunch by the stem; then place carefully on a tray. Every bunch must be treated in this manner. No rain or dew must fall on the trays of grapes destined as table raisins after being cut, as that would spoil the bloom, and its retention is one of the principal objects aimed at. When the grapes have been some time in the sun, say three or four days, and are slightly wilted, the trays may be carefully removed to a drying ground, so that they may be better under control. The best Spanish raisins are never turned, but here they are generally turned after eight to ten days. When the bunches are nearly dry they are sorted, and when the berries no longer exude a watery fluid when rolled between thumb and finger, they are placed in boxes of about 25lb. each. Do this with care, and while the berries are quite hot. After a few days the stems will have toughened, and can be handled, and are then ready for packing; but before being packed each bunch is held up by the stalk and any inferior or damaged berries are cut out. The layers are generally put up in neat paper-lined boxes, holding about 5lb. each.

### YOUR LEISURE MOMENTS.

"During the fruit season any of you who have extremely fine Gordos, and find time hanging heavily on your hands, may fill in all your leisure by drying a ton of layers. The labor question in Australia certainly prohibits anything like an attempt to produce layers on a large scale, but a little might be done where a man's family could attend to the work, for I am satisfied that only a person interested will take the care that is necessary to produce good table raisins. In conclusion, I would say that the man who takes up the growing and drying of fruit as his life's business, must be prepared to work and to give that business his best attention. He must seek ever to produce not only the largest crops, but also the best quality in the dried article that is placed upon the market. And I would like him to remember that, however much he may know regarding the growing and drying of fruit, he will never know all there is to learn in connection with it. With the exception of about seven years of my life, I have spent it all in trying to get a living out of the soil, and well over 20 years I have devoted to trying to learn something of horticulture, and the little I have learned is just sufficient to show me the immensity of the unexplored regions lying all around. But I am satisfied that if a man will work and think, take advantage of every means at hand to accumulate knowledge, in this business he can make a fair living, and that amidst pleasing and ofttime beautiful surroundings."

### The Discussion.

Mr. H. S. Taylor said that Mr. Hopkins, of Mildura, had made a commercial success of the Smyrna fig, and had grown the fruit apparently at not a heavy cost. Mildura had at the time quite a large area under figs, but they were mostly Genoas. The Adriatic fig was also a success, but it was not payable to grow large quantities. He advocated the growing of the Adriatic figs, and if the Smyrna fig proved a success, then they could be grafted on to the Adriatic, which made an excellent stock. Mr. Hopkins had informed him that the Smyrna fig could be dried on the tree and then shaken off.

Mr. Ross—That is if the birds will leave them alone.

Mr. Taylor said that Mr. Hopkins had also informed him that the picking of the Smyrna fig was not attended with the inconveniences which obtained with other varieties.

Mr. Beverley (Pyap) said that he had made a success of the white Adriatic fig. If the packing could be done at home it was preferable, as the fruit required careful handling. He found that the Adriatic fig grew best on deep sandy soil, and when they got away from the deep soil the quality fell away. He thought the Adriatic preferable to the Smyrna figs he had seen on Mr. Hopkins's block.

Mr. F. H. Basey (Renmark) said that his firm had sent 20 boxes of pears to London, and the returns, which had just been received, showed that they brought 95s. per cwt., which was highly satisfactory, as it brought them 8¼d. per lb., and he felt that there was no reason why they should not capture the market. He urged that the pears should be sulphured until they were like a pudding. They had washed pears and peaches with a caustic solution, and it improved the fruit. The quantity of caustic used was about 1lb. to 50galls. of water. The drying tray most suited for pears was the ordinary 3 by 2, but they must keep the trays well separated, as the fruit must have air.

Mr. Quinn said that the finest dried pear he had ever seen was the Poire de Berriays. He had seen the gloss on prunes improved by the use of the prunes themselves—that was by a solution made by boiling prunes and using sugar. But he had also seen an improvement made by the use of molasses instead of sugar, which made the prune darker.

Mr. H. S. Taylor (Renmark) said that Mr. J. M. Smith's solution was 10lbs. prunes, 5lbs. sugar, and 2oz. salt. The whole question of prunes for the river was to get the best variety suited to the district, and if that was settled there was a future for prunes on the river settlements. The French prune was the most successful in California, and might ultimately prove the best for the river; but so far it had not proved a success.

Another speaker said that glycerine had been used for prunes.

Mr. Waters (Renmark) said that he advocated 4ft. drying racks in preference to the 6ft. rack.

Mr. A. E. Ross (Waikerie) did not think there was much to be said for the prune on the river.

Mr. Francis (Waikerie) said that he had the most success with the sugar prune. He thought the question of the stock was a great factor, and he believed that the apricot would prove a suitable stock for the river.

Mr. W. E. Muspratt (Renmark) agreed with Mr. Francis that the stock was the important factor.

Mr. Waters (Renmark) held that it was essential to have thermometers both inside and outside the dip, as in hot weather the fruit would take a hotter dip.

Mr. Beverley said that he had found 5ft. netting most suitable for racks. The 6ft. netting at the bottoms took the whole width of the hessian, and the upper racks gave a margin of 6in.

# ADVISORY BOARD OF AGRICULTURE.

The monthly meeting of the Advisory Board of Agriculture was held on May 9th, 1917, there being present Messrs. F. Coleman (chair), A. M. Dawkins, G. Jeffrey, J. Miller, T. H. Williams, W. S. Kelly, Professor Perkins, and H. J. Finnis (Acting Secretary).

Apologies were received from Messrs. Tuckwell, Colebatch, and Laffer.

*Experimental Farm on the Murray.*—The Minister of Agriculture wrote, in reply to the Board's communication, advising that an experimental farm should be established on the Murray. Money had been put on the estimates, but owing to the financial position, no expenditure could be incurred this year. Full consideration would be given to the claims of Berri when the site for the farm was being selected.

The Minister's communication made no reference to the Board's recommendation made on August 30th, 1916, and a deputation, consisting of Messrs. Coleman, Dawkins, and Jeffrey, was appointed to wait on the Minister and discuss the matter.

*Local Supply of Bone Manure.*—The Secretary stated that, from inquiries made, he had ascertained that the Abattoirs offal was being retained in this State for the purpose of the manufacture of manure.

*Roads Legislation.*—The Secretary reported that the Secretary of the Local Government Department had intimated that the spirit of the first two suggestions made to Branches by the Board in connection with minimum loads to be carried for country roads, and the width of tyres, was being embodied in a draft Bill at present being prepared. The Board instructed the Secretary to make available to the Local Government Department any suggestions received from Branches in this connection.

*Destruction of Foxes.*—Arising out of resolutions passed by the Conference of South-Eastern Branches, consideration was given to the question of effectively controlling the fox pest. The Chief Inspector of Stock referred to experiments which had indicated that the bones of foxes and other animals poisoned with strychnine retained the toxic properties of the poison for as long a period as 14 years, and on that account the use of strychnine might result in destruction of livestock. It was decided to seek a report from the Director of Chemistry on this matter.

*Australian-made Cornsacks.*—The following resolution was received from the Butler Branch of the Agricultural Bureau:—"In the opinion of this Branch, Australian-made bags should be made full standard size." The Branch pointed out that in some cases the capacity of the locally-made bag was 20lbs. less than that of the imported article. After due consideration, the board decided that, whilst they were fully aware of the desirableness of doing everything to encourage local manufactures, it was not reasonable that the producers should be subjected to unnecessary difficulties, and the Minister of Agriculture was therefore recommended to introduce legislation making it necessary for locally-made bags to conform to the same standard as that imposed on the imported sacks by the provisions of the Commerce Act.

*1917 Congress.*—It was decided that the usual Annual Congress should take place during show week this year, and a sub-committee, consisting of Messrs. Jeffrey, Colebatch, and Professor Perkins, was appointed to supervise arrangements.

*Branches.*—Permission was granted to the Roberts and Verran, Canowie Belt, and Yabmana Branches to go into recess for 12 months, or the duration of the war. Each Branch had written to the effect that many of its members had gone to the front, and others had left the district. At the instance of Mr. Jeffrey, it was decided to intimate that the Board felt proud that the members concerned had volunteered for active service.

*Leave of Absence.*—On the motion of Mr. Jeffrey, it was decided that Mr. W. S. Kelly should be granted leave of absence from the Board until the termination of the war, on account of his enlistment for active service.

*Congratulation to Col. Rowell, C.B.*—The Board decided to forward a letter of congratulation to Col. J. Rowell, C.B., on his election to the Senate.

*New Members.*—The following new members were added to the rolls of existing branches:—Rosenthal—Roy Luck; Clare—Jas. Scott, J. B. Nolan, B. E. Gray, J. Nayda, S. J. Bochmer; Mundoora—Arthur Hewett, Fred. Dolling; Crystal Brook—Roy L. G. Saint; Salt Creek—C. Venning, W. R. Lee, P. Gale; Minnipa—F. McPhail; Yadnarie—Jas. Denholm; Geranium—Clyde Prouse, Wm. H. Phillips, A. Fisher; Bookpurnong East—J. B. Roberts, A. W. Schier; Tatiara—Thos. Hill; Mount Barker—W. H. Flemming; Lone Pine—O. Kock, R. Neldner, H. A. Brocate; Monarto South—A. Schroder; Port Pirie—Alf. Feime, Kybybolite—Jas. W. Stephens; Orroroo—W. H. Birrell; Cygnet River— B. Govett.

# DAIRYING ON IRRIGATION AREAS.

Mr. G. Lane, of the Murray Bridge Branch of the Agricultural Bureau, contributed a paper on "Dairying on the Irrigation Areas," at the recent Conference of Murray River Branches. The methods of cultivation adopted on some of the reclaimed areas adjacent to Murray Bridge provided a valuable object lesson, he said.

## TILLAGE ON RECLAIMED LANDS.

"We find by experience that these reclaimed soils require different treatments. The soil lying adjacent to the river is extremely rich, and in an ideal state for growing any kind of fodder or root crops. Its natural fertility is something wonderful. It is very important to break up and cultivate this land thoroughly. Plough it to a depth of from 4in. to 6in., and work it down to a fine tilth. Use disc harrows, then ordinary harrows; afterwards the roller, and then, if it is not fining down to satisfaction, give it a good watering. Drain off the water within 12 hours, and when you go over it again with the harrrows you will get wonderful results as the consequence of this treatment. Not until it is equal to a flower bed is it advisable to seed. If you seed on a poor tilth it means a poor crop, especially if sown down in lucerne. This land will give at least six heavy hay crops per annum, and three short cuts or grazings. The lucerne continues to grow with vigor through the winter months. I doubt whether any other place in Australia can beat these reclaimed lands for the abundance of its lucerne crops, either in its green state or converted into hay. This frontage land, when sown under lucerne, will stand a fair amount of water if it is drained off rapidly, otherwise the lucerne plant will suffer. The back land, or what is termed the "gut" of the swamp, requires different methods; it is waterlogged, and more in the form of peat. This land can be cultivated and brought down to a fine tilth at half the cost of frontage land, but the water must be kept away by cutting well-defined drains around it. This land is equal to any other portion of the swamps if it is kept thoroughly drained, and if fallowed and then sown down with lucerne, and every care taken to keep the water away from it, excellent results will be secured.

## CROPS TO GROW.

We have found by experience that practically anything will grow to perfection on the swamps. The question of the hour is what is most suitable. For instance, all kinds of vegetables and flowers run riot. All classes of millet become a nuisance; therefore, as a dairyman who has paid for his experience, I advocate lucerne, maize, barley, oats, and wheat. You cannot go wrong with these. Lucerne is the best for all-the-year-round feeding; maize a stand-by as green feed or in the form of ensilage; barley, oats, and wheat as green feed or for grazing, or as catch-and-cover crops for lucerne. It is possible to get two bumper crops in the summer months, say, from October to April.

Then you have five months left out of the year in which to grow winter green feed, such as barley, oats, and wheat. By converting the maize into ensilage you are harvesting the cheapest and best fodder for winter use. The actual cost per ton this year, to me, including ploughing, cultivating, sowing seed, and putting through the ensilage cutter into the silo was 7s. 6d. On the dairy farm the silo is indispensable. It spells success, being the least expensive of all methods of conserving foods for the dairy or any other stock for winter feeding.

### A WORD ABOUT THE COW.

I have on several occasions explained what a good cow ought to return in 12 months. We have a few good ones in the States, but they are very few, and are lost sight of among the great number of profitless animals. The trouble is that we have not got the animals in the country, and the dairymen are compelled to keep cows of only 300gall. capacity alongside others that are giving up to 1,000galls. and 1,200galls., each cow getting the same amount of feed and attention. This is a serious loss to the State, and must be remedied; therefore I say look to the bull to build up cattle which will compete favorably with those of any other country. It matters not whether milkers or beefers are required, the right class of stock can only be produced by keeping a pure-bred sire. It is the profitless cow that keeps the average of the State so low, and it cannot be expected that such a cow, with even the best of pure sires, can throw profit-making milkers. We are waking up to the fact that there are only a few 800gall. cows in the country. We want 1,200gall., aye, even 1,800gall. cows. The haphazard methods of the past must give way to some form of law that will enable the State to remedy this defect. Considerable attention must be observed in the selection of a tip-top herd of milkers of different types, and pure sires of vigorous habits, the offspring of milkers well above the average line. And now is the opportune time to commence such a dairy. If the Government spent £20,000 on the venture, it would be the finest proposition ever entered into. If such a venture were put into operation, the heifer calves from the dairy should not be sold to any dairyman other than those having tested pure-bred bulls, and the young bulls could be sold at a nominal figure to all and sundry, to help build up the herds of the State. We want tens of thousands of such stock.''

In reply to questions, Mr. Lane said that an acre of lucerne on the swamp lands would carry two cows. He advised dairymen to always go in for pedigree animals, and he was a strong believer in the Jersey bull. In regard to Shorthorns, he had found that if they imported the purest breeds of Shorthorns from England, they, in a few years, went to beef.

# THE AGRICULTURAL OUTLOOK.

## REPORT FOR THE MONTH OF MAY.

The following reports on the general agricultural condition and outlook of the areas represented by the Government Experimental farms mentioned below have been prepared by the respective managers:—

*Booborowie.*—Weather—The beginning of May was dry, but on May 6th the dry spell broke up, and 18 out of the next 21 days were wet. The fall of over 4in. is a record for the month of May since 1898, when records were first kept. Crops—Very little grain has been sown, the excessive wetness of the season has hindered seeding. Natural Feed—Young grass is shooting, but the feed is weak, and the dry grass has been spoiled by the rain. Stock is in fair condition; some farmers have lost sheep. Pests—Mice are very destructive, in some cases destroying a third or more of the wheat saved for seed. Miscellaneous—Rabbits are becoming numerous.

*Eyre's Peninsula.*—Weather—The weather broke up early in the month, and it has continued cool and showery ever since. Up to date of writing (25th) we have received 280 points of rain, which is over 1in. above the average for the previous two months of May. Very little really cold weather has been experienced. For the year up to date we have received 6½in. of rain; considerably more than the average for the first five months. Crops—Farmers are hard at seeding as much as possible. The showers have deterred the work a fair deal, and this fact, coupled with the poor burning season, will mean a fair amount of comparatively late-sown crops. Natural feed is coming along plentifully, and the district will be greatly in need of more stock in the near future. Pests—The mice are still doing considerable damage, especially in sheltered places.

*Kybybolite.*—Weather—The dry spell continued up to the 6th May, but since then almost daily falls of rain have been recorded, totalling 472 points. These prolonged wet conditions are unusual for this month. Crops—Very little wheat was sown before the rains commenced, and since then practically no opportunity for sowing has occurred. Some oats had been sown previously, but generally speaking very little seeding has been done, and the season is so late that the area sown will be greatly diminished. Natural feed is very abundant. Stock generally are in good order; lambing results have been very satisfactory to date. Pests—Less trouble than expected has resulted from foxes, probably accounted for by the fact that rabbits are plentiful.

*Turretfield.*—Weather—May turned out a very wet month, and from the 6th to 27th a total of 408 points were registered. During the period mentioned there were only two days on which no rain fell. This has been the wettest May for seven years, and the rainfall is nearly four times as great as during the same month last year. No frosts were experienced. Crops—Owing to the mice plague farmers were afraid to sow their crops before rain, and since the rain started on the 6th it was so continuous that operations had to be almost entirely suspended. It was only during the last two or three days of the month that the land was in a workable condition. This fact has considerably shortened the seeding season, and work is now being pushed on with all possible speed. Natural Feed—Fields are showing green, and the heavy rains will have a beneficial effect on all grasses. The stubble lands did not yield such good grazing this year, on account of the ravages of mice in the paddocks. Stock are all in fair to good condition. Draught stock are showing an improvement, probably owing to the rest they had during the wet weather. Pests—After the heavy rains there has been a decided falling off in the number of mice in the district, though they are still very plentiful. A few large eagles have been observed. There are some foxes in the district, but no serious interference with the lambs has so far been reported.

*Veitch.*—Weather—Rainfall for month, 115 points; average for month at Veitch, 125 points. Very fair seeding rains have fallen, enough to give the early-sown a good start. Crops—Wheat fields sown early in the month are showing a nice, healthy green color, and should now come along well. Natural Feed—Good. Stock—All in healthy condition. Pests—Mice are doing a lot of damage in the fields, eating the young shoots as the grain germinates. Miscellaneous—Farmers in the district have stopped seeding, awaiting a good fall of rain to kill mice.

## DAIRY AND FARM PRODUCE MARKETS.

A. W. Sandford & Co., Limited, report on June 1st:—

Butter.—The weather during the month of May was wet, but butter production only showed a slight shrinkage, so that there is still a small surplus in this State of second and third qualities, which, in the absence of freight for Europe, will doubtless be absorbed in interstate markets. A proportion of first quality is still coming from the eastern States—in fact we have now to look as far away as Queensland to help to make up the shortage in supplies. Values at the end of the month for butter in pound prints were:—"Alfa," 1s. 7½d. per lb.; "Primus," 1s. 7d.; third grade creamery, 1s. 3d. to 1s. 4d.; choice separators and dairies, 1s. 4d. to 1s. 5½d.; fair quality, 1s. 3d. to 1s. 4d.; store and collectors', 1s. 1½d. to 1s. 3d. per lb.

Eggs.—Supplies are somewhat shorter than was the case during April, so that the market advanced further, the rates loose in the mart at the close of this month being —Hen, 1s. 7d.; duck, 1s. 8d. per dozen.

Cheese.—During the early part of May demand was slow, but later on stimulated inquiry was recorded, with considerable interstate trade. The proclaimed price was raised ½d. on the last day of the month. Present values are from 9d. to 9½d. per lb. for large to loaf.

Honey has been scarce, with values showing an improvement. Prime clear extracted 4¼d. to 4¾d.; second grades 3d. to 3½d.; beeswax very saleable at 1s. 8d. to 1s. 9d. per lb.

Almonds also have advanced in price, with export orders not being filled. Brandis, 11½d.; mixed softshells, 11d.; hardshells, 6d.; kernels, 1s. 9d. per lb.

Bacon.—Local curers have been able to obtain larger numbers of the live animals, so that supplies arriving have shown a marked increase. However, only slight fluctuations were recorded in rates, best factory-cured sides selling 10½d. to 11d.; middles and hams, 1s. to 1s. 1d.; rolls, 10½d. per lb.

Live Poultry.—The quantity of birds coming forward continues to be on the heavy side, but demand throughout the month having been brisk, good prices ruled. Heavy-weight table roosters, 2s. to 4s. each; nice-condtiioned cockerels and plump hens, 2s. to 3s.; light birds, 1s. 7d. to 1s. 10d.; ducks, 2s. 3d. to 4s.; geese, 4s. 9d. to 5s. 8d.; pigeons, 6d. to 6½d.; turkeys, from 7d. to 9¼d. per lb. live weight for fair to good table birds.

Potatoes.—Large quantities have been handled from the Adelaide Hills and South-Eastern districts, imports from other States having been confined to seed lines only. Onions.—There has been an improved inquiry for onions, but local and South-Eastern growers appear to have no difficulty in filling all orders, although in a few instances buyers have purchased from Victoria. Prices—Potatoes, £4 to £5 per ton on trucks Mile End or Port Adelaide. Onions, £5 to £5 15s. per ton on trucks Mile End or Port Adelaide.

# RAINFALL TABLE.

**The following figures, from data supplied by the Commonwealth Meteorological Department, show the rainfall at the subjoined stations for the month of and to the end of May, 1917, also the average precipitation to the end of May, and the average annual rainfall.**

| Station. | For May, 1917. | To end May, 1917. | Av'ge. to end May. | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| **Far North and Upper North.** | | | | |
| Oodnadatta | — | 3·28 | 2·39 | 4·76 |
| Tarcoola | 0·04 | 4·36 | 2·20 | 7·58 |
| Hergott | — | 2·47 | 2·48 | 6·04 |
| Farina | — | 2·95 | 2·80 | 6·70 |
| Leigh's Creek | 0·10 | 4·96 | 3·58 | 8·66 |
| Beltana | 0·10 | 5·58 | 3·71 | 9·22 |
| Blinman | 0·63 | 4·57 | 4·98 | 12·83 |
| Hookina | 0·97 | 9·00 | 3·03 | — |
| Hawker | 1·40 | 9·05 | 3·73 | 12·22 |
| Wilson | 1·24 | 6·50 | 3·70 | 11·78 |
| Gordon | 0·89 | 8·46 | 2·88 | 10·26 |
| Quorn | 1·89 | 6·86 | 4·18 | 13·78 |
| Port Augusta | 0·57 | 3·75 | 3·63 | 9·46 |
| Port Augusta W. | 0·66 | 4·16 | 3·17 | 9·36 |
| Bruce | 0·65 | 5·45 | 2·83 | 10·01 |
| Hammond | 0·85 | 8·24 | 3·67 | 11·46 |
| Wilmington | 1·84 | 6·96 | 5·68 | 18·26 |
| Willowie | 1·29 | 7·38 | 3·54 | 11·90 |
| Melrose | 5·07 | 11·93 | 7·37 | 23·04 |
| Booleroo Centre | 2 49 | 8·46 | 4·72 | 15 83 |
| Port Germein | 1·49 | 5·64 | 4·57 | 12·84 |
| Wirrabara | 4·34 | 9·89 | 5·77 | 18·91 |
| Appila | 2·20 | 7·56 | 4·85 | 15·08 |
| Cradock | 1·11 | 7·25 | 3·37 | 10·86 |
| Carrieton | 1·55 | 8·70 | 3·73 | 12·22 |
| Johnburg | 1·03 | 6·72 | 3·07 | 10·21 |
| Eurelia | 1·98 | 8·93 | 4·04 | 13·24 |
| Orroroo | 2·51 | 9·00 | 4·45 | 13·42 |
| Black Rock | 2·14 | 8·39 | 4·07 | 12·25 |
| Petersburg | 2·06 | 9·13 | 4·28 | 13·07 |
| Yongala | 2·56 | 9·36 | 4·20 | 13·94 |
| **North-East.** | | | | |
| Ucolta | 1·68 | 7·82 | — | — |
| Nackara | 0·87 | 7·82 | 2·34 | — |
| Yunta | 0·48 | 7·06 | 3·06 | 8·22 |
| Waukaringa | 0·25 | 5·99 | 2·84 | 7·94 |
| Mannahill | 0·79 | 5·37 | 3·09 | 8·46 |
| Cockburn | 0·36 | 6·48 | 3·09 | 7·97 |
| Broken Hill, NSW | 0·47 | 7·81 | 3·60 | 9·63 |
| **Lower North.** | | | | |
| Port Pirie | 1·67 | 6·65 | 4·70 | 13·21 |
| Port Broughton | 2·25 | 5·30 | 4·75 | 14·33 |
| Bute | 3·47 | 7·13 | 4·83 | 15·42 |
| Laura | 3·41 | 8·45 | 5·50 | 18·22 |
| Caltowie | 3·42 | 8·03 | 5·21 | 17·27 |
| Jamestown | 4·08 | 8·52 | 5·11 | 17·46 |
| Gladstone | 3·14 | 7·96 | 4·89 | 16·00 |
| Crystal Brook | 2·60 | 7·02 | 4·92 | 15·62 |
| Georgetown | 3·42 | 8·68 | 5 76 | 18·32 |
| Narridy | 3·14 | 7 77 | 5·26 | 16·79 |
| Redhill | 3·55 | 7·98 | 5·21 | 16·79 |
| **Lower North—*continued.*** | | | | |
| Spalding | 5·10 | 8·46 | 5·22 | 20·25 |
| Gulnare | 3·95 | 8·48 | 4·70 | 19·74 |
| BundaleerW. Wks. | 4·31 | 7·90 | 4·52 | 17·29 |
| Yacka | 3·93 | 7·84 | 4·57 | 15·27 |
| Koolunga | 3·72 | 8·38 | 4·81 | 15·94 |
| Snowtown | 3·60 | 7·63 | 4·95 | 15·70 |
| Brinkworth | 3·23 | 7·57 | 4·39 | 15·48 |
| Blyth | 4·31 | 8·39 | 5·34 | 16·34 |
| Clare | 7·07 | 13·23 | 7·54 | 24·30 |
| Mintaro Central | 7·59 | 13·65 | 6·16 | 21·99 |
| Watervale | 8·27 | 15·77 | 8·26 | 27·17 |
| Auburn | 8·10 | 14·40 | 6·95 | 24·25 |
| Hoyleton | 4·07 | 8·65 | 5·78 | 17·96 |
| Balaklava | 3·01 | 6·92 | 5·41 | 16·03 |
| Port Wakefield | 2·60 | 7 62 | 5·02 | 13·13 |
| Terowie | 2·02 | 7·06 | 4·28 | 13·71 |
| Yarcowie | 2·43 | 8·14 | 4·34 | 13·91 |
| Hallett | 3·21 | 6·25 | 4·71 | 16·40 |
| Mount Bryan | 3·64 | 6·78 | 4·39 | 15·73 |
| Burra | 4·63 | 7·48 | 5·50 | 17·82 |
| Farrell's Flat | 3·86 | 6·89 | 5·73 | 18·87 |
| **West of Murray Range.** | | | | |
| Manoora | 5·09 | 9·78 | 5·41 | 18·09 |
| Saddleworth | 5·26 | 9·66 | 6·42 | 19·69 |
| Marrabel | 5·17 | 9·00 | 5·88 | 18 94 |
| Riverton | 5·89 | 11·95 | 6·57 | 20·48 |
| Tarlee | 5·07 | 9·20 | 5·26 | 17·48 |
| Stockport | 4·03 | 7·48 | 5·10 | 15·89 |
| Hamley Bridge | 3·59 | 7·18 | 5·34 | 16·45 |
| Kapunda | 5·46 | 9·13 | 6·47 | 19·67 |
| Freeling | 3·70 | 7·25 | 5·64 | 17·85 |
| Greenock | 5·18 | 9·15 | 6·51 | 21·46 |
| Truro | 4·98 | 8·82 | 5·94 | 19·74 |
| Stockwell | 4·59 | 8·41 | 5·96 | 20·30 |
| Nuriootpa | 4·91 | 8·41 | 6·22 | 21·25 |
| Angaston | 5·38 | 9·97 | 6·53 | 22·25 |
| Tanunda | 5·46 | 9·25 | 6·91 | 22·28 |
| Lyndoch | 4·99 | 9·31 | 6·51 | 23·01 |
| **Adelaide Plains.** | | | | |
| Mallala | 3·14 | 7·05 | 5·48 | 16·88 |
| Roseworthy | 3·94 | 8·04 | 5·51 | 17·31 |
| Gawler | 4·57 | 9·64 | 6·38 | 19·21 |
| Two Wells | 2·17 | 5·65 | 5·39 | 16·36 |
| Virginia | 3·49 | 8·36 | 5·78 | 17 58 |
| Smithfield | 4·73 | 9·88 | 5·41 | 17·30 |
| Salisbury | 3·98 | 9·17 | 6·21 | 18·57 |
| North Adelaide | 6·07 | 13·38 | 7·72 | 21·49 |
| Adelaide | 5·19 | 11·21 | 6·93 | 21·04 |
| Brighton | 4·62 | 11·75 | 6·19 | — |
| Glenelg | 4·08 | 9·88 | 5·90 | — |
| Magill | 7·14 | 14·28 | 8·10 | 19·93 |

## RAINFALL—*continued.*

| Station. | For May, 1917. | To end May, 1917. | Av'ge. to end May. | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| ADELAIDE PLAINS—*continued.* | | | | |
| Glen Osmond ... | 7·75 | 15·40 | 7·76 | 25·26 |
| Mitcham ....... | 5·96 | 12·96 | 7·16 | 23·47 |
| Belair .......... | — | — | 8·88 | 28·64 |
| MOUNT LOFTY RANGES. | | | | |
| Teatree Gully.... | 7·57 | 14·46 | 8·58 | 28·19 |
| Stirling West ... | 14·45 | 25·78 | 13·22 | 46·70 |
| Uraidla ........ | 16·01 | 27·02 | 12·67 | 44·35 |
| Clarendon ...... | 7·09 | 15·47 | 10·30 | 33·67 |
| Morphett Vale .. | 4·05 | 10·50 | 7·31 | 23·32 |
| Noarlunga ...... | 4·44 | 10·95 | 6·30 | 20·28 |
| Willunga ....... | 5·29 | 13·45 | 8·14 | 25·98 |
| Aldinga ........ | 3·41 | 10·68 | 6·17 | 20·34 |
| Normanville .... | 3·83 | 9·57 | 6·55 | 20·65 |
| Yankalilla....... | 5·00 | 11·41 | 7·30 | 22·78 |
| Cape Jervis ..... | 2·90 | 7·40 | 4·96 | 16·34 |
| Mount Pleasant . | 6·29 | 10·97 | 7·75 | 26·87 |
| Blumberg ...... | 7·83 | 13·82 | 8·17 | 29·38 |
| Gumeracha ..... | 9·70 | 17·41 | 8·93 | 33·30 |
| Lobethal ....... | 1·52 | 8·95 | 9·50 | 35·38 |
| Woodside ....... | 8·22 | 15·18 | 8·59 | 31·87 |
| Hahndorf ....... | 6·77 | 13·18 | 9·54 | 35·45 |
| Nairne ......... | 6·06 | 12·48 | 8·53 | 28·83 |
| Mount Barker ... | 7·81 | 16·21 | 9·21 | 30·93 |
| Echunga ....... | 7·88 | 16·14 | 9·89 | 32·83 |
| Macclesfield ..... | 6·89 | 14·53 | 8·84 | 30·72 |
| Meadows ....... | 10·99 | 19·64 | 10·47 | 35·52 |
| Strathalbyn ..... | 3·40 | 8·12 | 6·24 | 19·28 |
| MURRAY FLATS AND VALLEY. | | | | |
| Wellington ..... | 2·94 | 6·92 | 5·10 | 15·01 |
| Milang ......... | 2·42 | 5·77 | 5·28 | 16·08 |
| Langhorne's Brdg | 2·47 | 6·35 | 4·77 | 15·27 |
| Tailem Bend .... | 3·15 | 8·52 | 4·65 | — |
| Murray Bridge .. | 1·82 | 5·25 | 4·86 | 14·32 |
| Callington ...... | 2·10 | 6·34 | 5·11 | 15·65 |
| Mannum ....... | 1·99 | 4·38 | 4·24 | 11·67 |
| Palmer ......... | 2·97 | 5·49 | 4·57 | 15·60 |
| Sedan .......... | 1·17 | 4·71 | 3·96 | 11·92 |
| Blanchetown .... | 0·46 | 1·52 | 3·91 | — |
| Eudunda........ | 3·70 | 6·39 | 5·30 | 10·71 |
| Sutherlands ..... | 1·31 | 2·89 | 3·01 | 17·33 |
| Morgan ........ | 0·76 | 2·23 | 3·15 | 10·60 |
| Overland Corner . | 0·63 | 4·01 | 4·05 | 11·42 |
| Renmark ....... | 1·10 | 5·91 | 3·55 | 10·93 |
| Loxton ......... | 1·42 | 7·71 | 2·89 | — |
| WEST OF SPENCER'S GULF. | | | | |
| Eucla........... | 1·99 | 5·66 | 4·46 | 10·13 |
| White Well...... | 1·83 | 5·19 | 3·04 | 9·67 |
| Fowler's Bay ... | 4·31 | 6·98 | 4·04 | 12·11 |
| Penong ......... | 3·13 | 6·04 | 4·22 | 11·93 |
| Murat Bay ..... | 2·60 | 5·66 | 3·15 | — |
| Smoky Bay ..... | 3·02 | 5·33 | — | — |
| Streaky Bay..... | 3·13 | 6·21 | 4·56 | 15·31 |
| WEST OF SPENCER'S GULF—*continued.* | | | | |
| Port Elliston .... | 4·76 | 8·35 | 4·46 | 16 49 |
| Port Lincoln .... | 4·30 | 7·73 | 5·92 | 19·88 |
| Tumby Bay .... | 1·88 | 5·68 | 4·26 | 15·00 |
| Carrow ......... | 2·74 | 8·88 | — | — |
| Cowell ......... | 0·73 | 4·80 | 4·41 | 11·76 |
| Point Lowly...... | 1·05 | 5·24 | 4·00 | 12·21 |
| YORKE'S PENINSULA. | | | | |
| Wallaroo......... | 3·08 | 6·38 | 5·03 | 14·05 |
| Kadina ......... | 3·36 | 6·60 | 5·41 | 15·88 |
| Moonta ........ | 3·30 | 7·83 | 5·38 | 15·22 |
| Green's Plains ... | 3·02 | 6·57 | 4·87 | 15·73 |
| Maitland ....... | 4·92 | 10·75 | 6·39 | 20·08 |
| Ardrossan ...... | 2·70 | 6·51 | 4·55 | 13·89 |
| Port Victoria ... | 3·08 | 8·60 | 5·09 | 15·21 |
| Curramulka ..... | 2·98 | 9·43 | 5·53 | 18·50 |
| Minlaton ....... | 3·53 | 9·13 | 5·31 | 17·41 |
| Stansbury ...... | 3·83 | 10·34 | 5·28 | 17·06 |
| Warooka ....... | 3·35 | 9·61 | 5·30 | 17·71 |
| Yorketown ..... | 2·98 | 7·83 | 5·26 | 17·47 |
| Edithburgh ..... | 3·50 | 8·44 | 5·41 | 16·48 |
| SOUTH AND SOUTH-EAST. | | | | |
| Cape Borda ..... | 4·02 | 7·69 | 7·34 | 25·09 |
| Kingscote ...... | 2·70 | 8·36 | 5·72 | 18·95 |
| Penneshaw ..... | 2·35 | 6·75 | 6·74 | 21·34 |
| Cape Willoughby.. | 3·43 | 7·62 | 6·01 | 19·69 |
| Victor Harbor ... | 4·03 | 10·25 | 6·85 | 22·18 |
| Port Elliot ...... | 3·63 | 9·30 | 6·51 | 20·33 |
| Goolwa ......... | 4·06 | 9·46 | 5·96 | 17·93 |
| Pinnaroo ....... | 3·20 | 5·67 | 4·90 | 16·74 |
| Parilla ......... | 3·06 | 5·65 | — | — |
| Lameroo ........ | 3·52 | 6·19 | 4·91 | 16·55 |
| Parrakie ........ | 3·42 | 6·66 | 4·21 | — |
| Geranium ...... | 3·97 | 7·73 | 3·83 | — |
| Peake .......... | 3·59 | 8·18 | 5·00 | — |
| Cooke's Plains .. | 3·69 | 9·41 | 4·51 | 14·74 |
| Meningie ....... | 3·95 | 9·38 | 5·99 | — |
| Coonalpyn ...... | 4·03 | 9·38 | 5·30 | 17·49 |
| Coomandook .... | 4·50 | 9·86 | 5·09 | 16·80 |
| Tintinara ....... | 4·18 | 8·59 | 5·59 | 18·78 |
| Keith........... | 3·81 | 8·66 | 5·51 | — |
| Bordertown ..... | 4·64 | 9·74 | 5·84 | 19·76 |
| Wolseley ....... | 3·78 | 7·61 | 5·33 | 17·72 |
| Frances ........ | 4·12 | 8·16 | 5·78 | 20·74 |
| Naracoorte ..... | 4·56 | 9·28 | 6·67 | 22·60 |
| Penola ......... | 5·22 | 10·24 | 8·03 | 26·78 |
| Lucindale ...... | 5·49 | 8·98 | 6·56 | 23·32 |
| Kingston........ | 6·41 | 10·73 | 7·34 | 24·73 |
| Robe .......... | 4·67 | 8·49 | 7·37 | 24·69 |
| Beachport....... | 5·20 | 10·24 | 8·21 | 27·51 |
| Millicent ....... | 5·97 | 10·57 | 9·07 | 29·25 |
| Mount Gambier . | 4·83 | 11·30 | 9·97 | 32·00 |
| C. Nrthumberland | 5·33 | 10·07 | 8·12 | 26·63 |

# AGRICULTURAL BUREAU REPORTS.

## INDEX TO CURRENT ISSUE AND DATES OF MEETINGS.

| Branch. | Report on Page | Dates of Meetings. | |
|---|---|---|---|
| | | June. | July. |
| Amyton | 903 | — | — |
| Angaston | * | — | — |
| Appila-Yarrowie | * | — | — |
| Arden Vale & Wyacca | * | — | — |
| Arthurton | * | — | — |
| Balaklava | * | — | — |
| Beaufort | * | — | — |
| Beetaloo Valley | 904–5 | — | — |
| Belalie North | * | — | — |
| Berri | 922 | 6 | 4 |
| Blackheath | * | 2 | — |
| Blackwood | * | 18 | 16 |
| Blyth | * | 9 | 14 |
| Bookpurnong East | 915 | — | — |
| Booleroo Centre | * | — | — |
| Borrika | 915 | — | — |
| Bowhill | * | — | — |
| Brentwood | * | — | 5 |
| Brinkley | * | — | — |
| Bundaleer Springs | 906 | — | — |
| Burra | * | — | — |
| Bute | * | — | — |
| Butler | * | — | — |
| Caltowie | * | — | — |
| Canowie Belt | § | — | — |
| Carrieton | * | — | — |
| Carrow | * | — | — |
| Cherry Gardens | 927 | 5 | 3 |
| Clanfield | * | — | — |
| Clare | 906 | — | — |
| Clarendon | 922 | 4 | 2, 30 |
| Claypan Bore | * | — | — |
| Colton | * | — | — |
| Coomandook | * | 4 | — |
| Coomooroo | * | — | — |
| Coonalpyn | 916 | — | — |
| Coonawarra | * | — | — |
| Coorabie | * | — | — |
| Cradock | * | — | — |
| Crystal Brook | * | — | — |
| Cummins | 912 | 2 | 7 |
| Cygnet River | † | — | 5 |
| Davenport | * | — | — |
| Dawson | * | — | — |
| Denial Bay | * | — | — |
| Dowlingville | 912 | — | — |
| Edillilie | * | — | — |
| Elbow Hill | † | — | — |
| Eurelia | † | 29 | 27 |
| Forest Range | 927 | — | — |
| Forster | * | — | — |
| Frances | * | — | — |
| Freeling | * | — | 5 |
| Gawler River | * | 4 | 2 |
| Georgetown | * | — | — |
| Geranium | * | 30 | 28 |
| Gladstone | * | — | — |
| Glencoe | 928 | — | — |
| Glencope | * | — | — |
| Goode | * | — | — |
| Green Patch | * | — | — |
| Gumeracha | * | — | — |
| Halidon | 916 | — | — |
| Hartley | 922–7 | 6 | 4 |
| Hawker | * | — | 3 |
| Hilltown | * | — | — |
| Hookina | * | — | 3 |
| Inman Valley | † | 7 | — |
| Ironbank | § | — | — |
| Julia | * | — | — |
| Kadina | * | — | — |
| Kalangadoo | * | 9 | 14 |
| Kanmantoo | * | 2 | — |
| Keith | * | — | — |
| Ki Ki | * | — | — |
| Kingscote | * | — | — |
| Kingston-on-Murray | * | — | — |
| Kongorong | 929 | — | 3 |
| Koonibba | 915 | — | 3 |
| Koppio | 913 | 5 | 3 |
| Kybybolite | 930–6 | 28 | — |
| Lameroo | 922 | — | — |
| Laura | * | — | — |
| Leighton | * | — | — |
| Lone Pine | 907 | 5 | 10 |
| Longwood | * | — | — |
| Loxton | * | — | — |
| Lucindale | * | — | — |
| Lyndoch | 908 | — | 5 |
| MacGillivray | * | — | — |
| Maitland | * | — | — |
| Mallala | † | — | 9 |
| Mangalo | * | — | — |
| Mantung | 917 | — | — |
| Meadows South | * | 5 | 3 |
| Meningie | * | — | — |
| Milang | 928 | — | — |
| Millicent | * | — | 10 |

## INDEX TO AGRICULTURAL BUREAU REPORTS—*continued.*

| Branch. | Report on Page | Dates of Meetings. | |
|---|---|---|---|
| | | June. | July. |
| Miltalie | 913 | 30 | 28 |
| Mindarie | * | 4 | 2 |
| Minlaton | * | 29 | — |
| Minnipa | 914 | — | — |
| Mintaro | * | 2 | — |
| Mitchell | § | — | — |
| Monarto South | 917 | — | — |
| Moonta | * | — | — |
| Moorlands | * | — | — |
| Morchard | * | 2 | — |
| Morgan | * | — | — |
| Morphett Vale | † | — | — |
| Mount Barker | 923-4 | — | 4 |
| Mount Bryan | * | — | — |
| Mount Bryan East | * | — | — |
| Mount Compass | † | — | — |
| Mount Gambier | 933-6 | — | — |
| Mount Hope | * | — | — |
| Mount Pleasant | * | — | — |
| Mount Remarkable | * | — | — |
| Mundalla | † | — | — |
| Mundoora | 906 | — | — |
| Murray Bridge | 922 | 4 | — |
| Mypolonga | 917-22 | — | 4 |
| Myponga | * | — | — |
| Myrla | * | — | — |
| McNamara Bore | * | — | — |
| Nantawarra | 909 | — | — |
| Naracoorte | 936 | — | — |
| Narridy | * | — | — |
| Narrung | 926 | — | — |
| Netherton | * | — | — |
| North Booborowie | * | — | — |
| North Bundaleer | * | — | — |
| Northfield | 909-11 | 5 | 3 |
| Orroroo | * | — | — |
| Parilla | * | — | 5 |
| Parilla Well | * | — | — |
| Parrakie | * | — | — |
| Paskeville | * | — | — |
| Penola | * | — | — |
| Penong | 915 | 9 | 14 |
| Petina | * | — | — |
| Pine Forest | * | — | — |
| Pinnaroo | * | — | — |
| Pompoota | 918 | 13, 27 | — |
| Port Broughton | † | — | — |
| Port Elliot | 927-8 | 16 | 21 |
| Port Germein | * | — | — |
| Port Pirie | 906 | 2, 30 | 28 |
| Quorn | * | — | — |
| Ramco | 919 | 4 | 2, 30 |
| Redhill | * | — | — |
| Renmark | 919 | — | — |
| Riverton | * | — | — |
| Roberts and Verran | § | — | — |
| Rosenthal | 911 | 6 | 4 |
| Rosy Pine | 921-2 | — | — |
| Saddleworth | 910 | — | — |
| Salisbury | 911 | — | — |
| Salt Creek | 914 | — | — |
| Sandalwood | * | — | — |
| Sherlock | * | — | — |
| Spalding | * | — | — |
| Stockport | * | — | — |
| Strathalbyn | 928 | 5 | 3 |
| Sutherlands | * | — | — |
| Tantanoola | 936 | — | 7 |
| Tarcowie | * | — | — |
| Tatiara | * | 2 | 7 |
| Tintinarra | * | — | — |
| Two Wells | 911 | — | — |
| Uraidla and Summert'n | * | 4 | 2 |
| Waikerie | * | 1, 29 | 27 |
| Warcowie | * | — | — |
| Warrow | 914 | — | — |
| Watervale | 912 | — | — |
| Wepowie | 903 | 2, 30 | 28 |
| Whyte-Yarcowie | * | — | — |
| Wilkawatt | * | — | — |
| Willowie | * | — | — |
| Wilmington | 904 | — | — |
| Wirrabara | 906 | — | — |
| Wirrega | † | — | — |
| Wollowa | † | — | — |
| Woodleigh | † | — | — |
| Woodside | * | — | — |
| Wynarka | 921 | — | — |
| Yabmana | § | — | — |
| Yacka | * | — | — |
| Yadnarie | 915 | — | — |
| Yallunda | * | — | — |
| Yaninee | * | — | — |
| Yeelanna | * | — | — |
| Yongala Vale | * | 4 | 2 |
| Yorketown | * | — | — |

* No report received during the month of May. † Formal report only received.
‡ Held over until next month. § In recess until termination of war.

# ADVISORY BOARD OF AGRICULTURE.

## Date of Meeting—July 11th, 1917.

# THE AGRICULTURAL BUREAU OF SOUTH AUSTRALIA.

**Every producer should be a member of the Agricultural Bureau. A postcard to the Department of Agriculture will bring information as to the name and address of the secretary of the nearest Branch.**

**If the nearest Branch is too far from the reader's home, the opportunity occurs to form a new one. Write to the department for fuller particulars concerning the work of this institution.**

## MEMORANDA FOR THE MONTH.

CONGRESS.—The Twenty-eighth Annual Congress of the Agricultural Bureau will take place in Adelaide in September next. Branches have been invited to suggest subjects for consideration. These suggestions should be forwarded to the Secretary Advisory Board as early as possible.

BRANCHES ANNUAL MEETINGS.—The majority of Branches will be holding their annual meetings during the current month. Regard should be paid to the rule governing membership, *i.e.*, one-third of the members, viz., those that have attended the fewest meetings during the year, retire. Such members are eligible for re-election, on the recommendation of the Branch.

THE COMING YEAR'S WORK.—One of the most important matters to receive attention is the mapping out of the work of the Branch for the year. This cannot be too strongly emphasized.

PINNAROO LINE BRANCHES.—The Branches situated on the Pinnaroo line of railway will meet in conference at Pinnaroo in the near future. Every member of every Branch in the district should make it his business to be present at the conference.

# REPORTS OF BUREAU MEETINGS.

## UPPER-NORTH DISTRICT.

### (PETERSBURG AND NORTHWARD)

### AMYTON (Average annual rainfall, 11.82in.).

May 8th.—Present: 10 members and three visitors.

PICKLING SEED WHEAT.—This subject was dealt with in a paper by Mr. S. Thomas, who referred to the very heavy loss which resulted from smut. While the production of a clean crop of wheat before the introduction of the drill was an easier proposition than it was to-day, if ordinary care were taken it was still possible to produce a crop not affected with smut. He preferred pickling by immersing the wheat in a solution of slightly over 1 per cent. bluestone. The wheat was allowed to remain in the solution to ensure any smut balls contained therein being thoroughly soaked. An interesting discussion followed the reading of this paper.

### WEPOWIE (Average annual rainfall, 13in. to 14in.).

May 8th.—Present: 11 members and two visitors.

THE YOUTH ON THE FARM.—The following paper, dealing with the treatment of the young men on the farm, was contributed by the Hon. Secretary (Mr. Thos. F. Orrock):—In dealing with this subject I wish to point out, first, my opinion why boys in a good many instances prefer leaving the land and working for wages in the cities; and second, some suggestions as to how this crowding to the cities could be prevented. Few things are more astonishing than the want of sympathy between parents and children. Many parents seem insensible to their thoughts and desires. There are two principal causes. One is their difference in age. The fathers are losing, or have lost, interest in many of those things which are just beginning to most keenly interest their children. The children are quick to note this, and the confidence they will give to a comparative stranger they withhold from parents, because they dread ridicule, coolness, and displeasure. The other fact—parents will insist in regarding their boys as children, even after they are grown up. They cannot understand independence of thought. They must always do exactly as they are told without question; and I contend that the average farmer is 20 years behind the times in the treatment of his boys, as regards stimulating the desire to remain on the land, in comparison to the inducement the fairly well-educated youth meets with in even the comparative small country towns of to-day. Therefore the boy naturally has a desire to enter a branch of work that offers the greatest inducement to his advancement, and where, if he does his work well, he is sure of promotion. My argument is that if the same inducement were offered on the farm hundreds of lads would remain on the land that now go to the over-populated cities of Australasia. In regard to the suggestions *re* making the land more attractive for the farm youth, the most responsible person is the farmer himself. What inducement is it for a lad to leave his city companions and come home from school to the land unless he thinks he can do as well for himself as his city friends? My opinion is that the boys should be taken more into the management of the farm, and have either a certain portion of crop allotted to them, or, better still, a percentage. It would induce them to grow as good a crop as they possibly could, and thus benefit all concerned, and also give the lads an insight into the financial part of the business. In dozens of little ways the farmer could make farming more attractive for his boys by encouraging them when they have done some particular piece of work exceptionally well, and by encouraging competition in local shows, &c. In a country like Australia, where agriculture plays the leading role in promoting national prosperity, it is highly desirable that every inducement possible should be given to youths to stay on the land. And wherever possible the farmer should use the most thorough methods of farming and the most efficient mechanical appliances he can afford.

### WILMINGTON (Average annual rainfall, 18.26in.).

May 9th.—Present: 11 members and one visitor.

Clean Wheat.—Mr. H. Farrell, in presenting a paper with the title "Clean Wheat," said it was necessary to have the cleanest sample of wheat possible, both for market and for seed. A 1 per cent. to 1½ per cent. solution of bluestone was the best means of preventing the development of smut. That could be used either with a patent pickling machine, one of which he was using, or by the old method of floor pickling. If formalin were used the seed should be sown immediately after treatment; otherwise it should be kept until after the first week before being sown. Reference was made to the quantity of foreign matter that was bagged with the wheat, and farmers were urged to exercise every effort to produce a clean sample. Messrs. Aughey, Goodenough, W. and G. Schuppan, Modystach, and Zimmermann were agreed that wheat should not be sown unpickled. It was deplorable that such large quantities of rubbish should be shipped with the wheat.

## MIDDLE-NORTH DISTRICT.

## (PETERSBURG TO FARRELL'S FLAT)

### BEETALOO VALLEY (Average annual rainfall, 18in. to 19in.).

April 13th.—Present: eight members and one visitor.

Fruit Growing.—A paper dealing with this subject was contributed by Mr. J. Burton. He said—"Fruit trees are more cosmopolitan in the matter of soils than is generally supposed, and each kind will adapt itself to a wide range of soils. Some soils are, however, better suited for particular kinds of trees, and these peculiarities should be recognised by the planter as far as possible. Ground for trees should be carefully prepared, so that the trees may be placed under the best possible conditions for making strong, healthy growth. A good root bed is required to provide the materials for feeding the trees, and secondly to enable the trees to get a firm hold of the soil. Deep stirring of the soil and loosening the subsoil is the most perfect way of preparation, and gives the widest field from which the roots can obtain nourishment and moisture. Heavy soils, more especially, require deep cultivation; lighter soils, and more particularly those resting upon open, gravelly, or limestone subsoils, may from motives of economy, be treated in a more superficial manner; but even this class of land will, as a rule, give better results if deeply worked. It is a matter of some importance to growers, in planting fruit trees, that they should select kinds and varieties that are likely to give the most satisfactory results. The first consideration should be to plant such kinds of fruit as are best adapted for the particular locality. Some kinds will adapt themselves to a wide range of climate and soil. Many of these, however, may be cultivated under various conditions, but will thrive better and give more satisfactory returns in some places than others. This object should more particularly be kept in view by cultivators for market. In the warmer districts the fruits that should receive special attention are the grape, peach, apricot, orange, and lemon. All these fruits reach the highest degree of perfection, as the strong heat and light at the ripening period develops their flavor to the fullest. Though the apple, pear, and plum naturally belong to cooler regions, and may be grown with a fair amount of success in the moderately warm districts, yet better results will be obtained from other localities. These fruits, when grown in the cooler districts, will generally be higher in quality and keep better than if raised in the warmer districts. Then again the trees are not likely to prove so durable in warm as in cool districts. In some districts, however, there is a sort of intermediate climate between the warmer and cooler districts, and in those localities planters may indulge in a wider range of fruits with success. Special care should be taken in planting to select varieties of each kind that are best adapted for the particular requirements of the grower, who should decide as to the way in which his fruit will be utilised before starting. If his object is to supply fresh fruit to the market he must, as a rule, have varieties that will yield in succession, and those that will keep well, so that he can meet the demand for a long period. It is also advisable in the case of all dessert fruits that they should be attractive as well as possessing other desirable qualities. Good-looking apples, pears, peaches, and other fruits will always command a more ready market than varieties that are less attractive in appearance. There is some difference of opinion among fruit growers as to the most favorable time for planting, but I favor early planting of deciduous trees. For oranges, lemons, and other evergreen trees, the most suitable time is early autumn or spring. To enable the ground to be worked in the most convenient manner, trees should be planted in squares, and each kind, of fruit, or even varieties by themselves, to facilitate treatment. This is more essential with spraying and irrigation; one may require spraying or watering, when another does not. Pruning is one of the most important operations in horticulture. The theory of pruning is to promote development in certain directions by checking it in others. There are two ways in which this may be done, one being the cutting of the branches, and the other the reduction of the roots; one method produces precisely the opposite effect to the other. The art of pruning is to apply to the trees such treatment as will best accomplish some particular purpose, and the operator must take into consideration the peculiar circumstances of each tree before touching it. In pruning to assist a tree to attain a desired form it will be necessary to take into consideration its natural habit, the modification required, and how it is to be effected. The object of the pruner should be to get well-balanced trees, and as perfect in form as possible. Trees should be trained to assume the desired forms from the time they are planted, removing and shortening back such shoots as may be necessary. A well-formed tree is much easier for gathering fruit and more convenient for spraying. Fruits of all kinds should be gathered at such a stage of maturity as will develop their desirable qualities to the fullest extent or best serve the special purpose of the grower. The proper degree of maturity at which fruit should be gathered will, as a matter of course, vary considerably according to the kind. Apples should be gathered immediately before they become fully ripe. If left too long upon the trees the fruit, when kept, is apt to become mealy, and to lose in flavor, more or less. Pears are somewhat peculiar in ripening, and fruit in perfection is seldom obtained if allowed to mature upon the trees. The time the fruit will take to come to perfection, after it is gathered, will vary considerably, according to the variety. It is a matter of importance to growers that they should be able to keep some kinds of fruit for as long a period as possible, in order to extend the season and the demand for their produce. In a discussion which followed Mr. Jacobi mentioned the Japanese plum as a profitable fruit to grow.

### PORT PIRIE (Average annual rainfall, 13.21in.).

April 7th.—Present: nine members.

WHEAT GROWING.—It was often difficult, observed Mr. A. W. Noll, in an address on wheat growing, to determine when to commence seeding operations on land liable to drift. He recommended sowing such land as soon as possible after rain with a wheat which stooled well. Though the returns from land so sown might not be so remunerative, it would probably save the crop from being blown away. It was inadvisable to sow immediately after rain, when the ground was in such a condition that the seed furrows remained open, because the seed would not germinate properly, and, if necessary, the harrows should follow the drill. Land should be tilled lightly to kill the weeds, the more closely to the surface they were cut the more quickly and more likely they were to be killed. When the soil was becoming dry on top it should be cultivated lightly, closely behind the drill; the drilling, if anything, being deeper than the cultivation, because by that means the seed was being placed in damp soil and would have a better chance of germinating. In the discussion which ensued members indorsed the views expressed in the address.

### WIRRABARA (Average annual rainfall 18.91in.).

April 2nd.—Present: 15 members.

SUMMER FALLOWING.—A paper on this subject was contributed by Mr. F. Carson, who referred to the many advantages which followed the practice of summer fallowing, the more particular being the heavier yield, and the absence of diseases on crops on summer-fallowed land. He expressed the view that the land should be ploughed to a depth of 6in., and as it would be pulverised by the rain, there was no necessity to work it down fine. Land treated in that manner should be cultivated before winter fallowing was commenced.

BEETALOO VALLEY, May 14th.—QUESTION BOX.—A number of questions were considered by members. Generally they agreed that milk and pollard and also crushed barley constituted the best food for fattening young pigs. Most members favored the Berkshire, and Berkshire and Poland China cross as the most suitable breed for this district. Others favored the Essex. As to the best quantity of seed to sow in this district, opinions varied from 1bush. to 1½bush.; and from 50lbs. to 120lbs. super. per acre was considered a suitable dressing.

BUNDALEER SPRINGS, May 1st.—After the compilation of a programme for the year 1917 a general discussion on topics of interest took place. Reference was made to the inferior quality of cornsacks and the variation in size of same. Mr. Travers explained several difficulties that had occurred in working binders.

MUNDOORA, May 7th.—The discussion on pickling wheat, which was commenced at the previous meeting, was continued. Mr. Noble mentioned that he had found sheep dip a cheap and effective method for poisoning mice.

## LOWER-NORTH DISTRICT.

### (ADELAIDE TO FARRELL'S FLAT.)

### CLARE (Average annual rainfall, 24.30in.).

Present: 14 members.

SOME NOTES ON HORSE-BREEDING.—Mr. C. Neate submitted the following paper on horse-breeding:—"In introducing the above subject several facts have come under my notice during the last four or five years. I have noticed that there is a falling off in the number of foals reared annually, and also a diminishing number of stallions plying for hire compared with the preceding five years, and one naturally inquires the reason for the falling off. Of course, in horse-breeding, as in all other stock lines, the market rate is a large factor in the natural supply of stock, and it cannot be denied that the market value of horses during the last four or five years has been somewhat low compared with prices ruling some six or seven years ago. The reason of the extreme prices of that period will be found in the fact that the breeding of horse stock had not kept pace with the expansion of cultivation, and with the opening up of large tracts of mallee lands the demand overtook the supply, with the result that high prices prevailed, and those who were in the fortunate position of being sellers reaped the benefit. To my idea the same conditions are recurring now. If we take into consideration the heavy losses of the 1914 drought, and the large number exported out of Australia for war purposes, and the appalling loss of horses in this awful conflict, one is forced to the conclusion that with the return of peace conditions and the expansion of agricultural areas there is bound to be a good demand for horses, if not at extreme rates, at least at very payable prices, notwithstanding the fact that motor traction will command more attention in the future than it has in the past. That causes one to ask the question, 'What is the best type of horse to breed?' That is for each individual breeder to decide for himself, but whatever type he fixes on he should endeavor to breed the best, for a good horse costs no more to keep than a bad one, and very often less. If I were asked the question which type I personally preferred, my vote would be given to the Clydesdale. Well-bred Clydesdales will always command attention and remunerative prices. They are more quick and jaunty in action than the Shire, and having great powers of endurance renders them most suitable for farm or garden; but for heavy haulage on the roads the Shire may be preferable. In selecting a Clydesdale sire I would look for the following points—Strong, masculine head, yet with an entire absence of beefiness, strong neck, deep quarters, well ribbed up, short back, broad over the loins, full hard muscle on breech, but not extending too far down the leg, close knee joints, flat bone, and well-developed feet, and standing about 16 hands high. In selecting mares to mate with a sire, judgment must be used to see that if the sire is lacking in any of the foregoing points that the mare is not also at fault, otherwise the fault may be perpetuated in the progeny; if the sire is a bit on the leg, mate him with a close, thick-set mare, or *vice versa*, as the case may be, but above all, breed only from sound stock with a long line of noted ancestors behind them. Even though the cost of service may be a few shillings more, the value of the progeny may be pounds compared with the progeny of inferior and cheaper sires. In this district, especially among the gardeners, taken on a whole, medium draughts are kept, yet from mares of this type a very serviceable type of horse can be raised. If it be desired to breed something more weighty, then cross with the Shire or Clydesdale, or if you wish to breed harness or remounts, cross to the thoroughbred, but let the sire be a stud book horse, and one of proved stamina, and the possessor of a set of sound legs, for no matter how good the body may be, unless the legs are sound the colt is of little value. In my past experience I have, by using a thorough-bred stallion on active medium draught mares, been successful in breeding some first-class harness and remount types, but I would not recommend crossing the latter class again to the blood horse in any but exceptional cases. In conclusion, if these few notes will cause a deeper interest in horse-breeding generally, its object will have been achieved.'' The President concurred in the view that Clydesdales were the most suitable for farm work. Mr. T. J. Edwards preferred the coaching stamp, an active draught mare sired by blood horse, and resultant foals again put to blood sire, giving activity, endurance and appearance. Mr. J. C. Dux generally agreed with writer of paper, but placed most confidence in staunchness of breeding mares rather than appearance, which was often deceptive. He contended that established farmers should never have to buy in open markets, but should always be able to produce enough young horses to keep their teams young, and the practice of selling young, untried horses was unsatisfactory from a financial standpoint. Mr. M. L. Nolan considered extremely high prices in the past were the result of extraordinary demands created by the opening up of new farming areas, and a largely artificial value was put upon farm stamps. With the return of normal conditions after the war there was likely to be a scarcity again, and it behoved every farmer to keep up the breeding of horses. Mr. C. L. Scott moved, and Mr. Dux seconded a vote of thanks to Mr. Neate for his paper, which was carried by acclamation.

## LONE PINE.

May 1st.—Present: 22 members and five visitors.

**Sheep Breeding on a Farm.**—In a paper dealing with the breeding of sheep on a farm Mr. Fritz Fromm advocated commencing with pure breeds, if in any way possible for wool as well as for market. A ram should not be used until it was two to two and a half years old, and should not be too fat when used. A ewe should be one and a half years old before being mated, and to obtain good lambs and a good percentage it was essential to run the ewes on poor feed in order to have them in a middling condition when putting the rams with them. A young ewe should be mated with an aged ram, say 3½ years old. All ewes with blind teats should be culled for killing. A ewe from six-tooth to full mouth would produce the best lamb, but care should be taken not to breed from a broken-mouthed ewe. It might be all right in early and good seasons, but in late seasons and cold wet winters it might be very unprofitable. It was better to cull them out for killing. He advocated the mating of young ewes about the beginning of November, the ram being allowed to run with them for five weeks, which would secure a March and April lambing. For spring lambing the older ewes should be mated in March and April. It was unwise to allow rams to run with the ewes all the year round in a flock exceeding 100 sheep, because there would most likely be lambs dropped at shearing time, which would be very unprofitable. A young ram should not be used on more than 35 or 40 ewes. It was also essential to select a well-sheltered paddock (to keep off cold winds in wet weather) into which the ewes could be put when lambing commenced, because a newly-born lamb was apt to catch pleurisy. In discussion, members in general agreed with the points in the paper. In reply to a question Mr. Fromm said that he preferred in that district a Dorset Horn-Lincoln ram with a Cuthro-bred ewe, because both were excellent for wool and market.

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### LYNDOCH (Average annual rainfall, 23.01in.).

May 3rd.—Present: 13 members.

Marketing Fruit.—The Chairman (Mr. F. Moore) contributed a paper on this subject. He said the primary producer should consider the advisability of combining and employing trained business men to improve the marketing of the product of the land. "If fruit and vegetable production is to extend, and take its place in the feeding of the people, something must be done to reduce the cost of distribution. The usual retail profit on vegetables is 100 per cent., and fruit up to 300 per cent. to 400 per cent. Now, if we could form a combine or pool, instead of each individual selling separately and competing, the product of a district would be sold through the pool (not to it), with a keen business man in charge, whose business would be to keep in touch with the markets, the canners, and the jam makers; to advise growers which market could absorb the produce, and at what price; because, as far as I know, at present there is no market price, but each one gets what he can, or what the packer fixes for the day. But this would only help in the first handling of the goods, and it is in the retail or second handling that the big increase in price takes place; and one of the main duties of officers of the combine would be to study the retail part of the business, with the idea of advising the growers of any method of cheapening the distribution, and in advertising the food value of fruit (fresh and dried) and vegetables, and in some way what the consumer ought to pay for it. There is one method that might assist in bringing grower and consumer together, that is to obtain a system of declared value freights on the railway. When sending away goods the consignor would declare the value, and the railways collect the money at the same time that they collected the freights, and pay the consignor (at the place of booking) at the end of each month. The grower, by sending price lists and advertising, would soon get in touch with people who would be only too glad to obtain cheap goods direct from the producer without the trouble of much correspondence and forwarding of money. It would also give the packer in the market a chance to put up, say, a 5s. box of mixed fruit and vegetables, and many in the outside districts would be only too glad to have a case each week. If taken up and well advertised, it should become popular, and would also be a check on the retailer, as the packer should be able to give at least double the quantity for the same money as the retailer does at present. Another point at which co-operation is needed is in the mechanical grading and packing of apples for export. If we are to obtain the best returns for our apples, we must reduce the number of brands, and the grading must be uniform for the State. The value of collective bargaining is well illustrated in Australia to-day. The production of dried fruits is, I think, drifting towards disaster for want of business methods in marketing. We are trying to make a living from a small output at a big price, instead of a large output at a less profit. We are producing more than is consumed in Australia, yet on account of high price restricting the quantity consumed locally. We have the Federal Government taking action to prevent foreign countries dumping their surplus products on our markets, while we take advantage of a high duty to charge exorbitant prices to home consumers, dumping our surplus on outside markets at a loss, or else distilling. Can we grow currants at a profit against world competition? Greek currants are usually 14s. to 18s. per cwt. for second quality, 21s. to 24s. for best grades. The average production in South Australia is 1 ton per acre. My working cost for 1 acre—that is ploughing, cultivation, pruning, picking, grading, and marketing, and interest on land and plant—is £10 2s. 6d.; 1 ton of currants at 3d. equals £28—a difference of £17 17s. 6d. So I think we can afford to reduce the present price and still make a living. From 20 years' experience retailing currants I know that if the consumers can buy them at, say, 5d. a lb., they will use considerably more. Now, take dried apricots. Last year I was beaten in my own market, Gawler, by Californian fruit. At the recent Conference, one speaker expressed indignation at our boys at the front being fed on foreign food; but if our people asked the same price from the Federal military authorities as they asked local consumers to pay, the growers deserved to be passed by. This year I worked out the cost of handling and drying 100 cases of apricots, and found that 8d. per lb. was equal to 4s. per case fresh fruit in the garden. I see the market price is about 11d., so the home consumer again is charged the duty. Californian fruit is quoted at 8½d., so that my price appears to be about a fair thing. Now, would it not be better to give home trade a chance to expand by reducing prices? The industry has grown beyond the limit of home consumption under present conditions, and if we cannot compete in the world's markets, there must before long come a slump.—Members expressed a desire that other Branches should consider and discuss the suggestions contained in the paper, with the idea of evolving some practical scheme of co-operation.

### NANTAWARRA (Average annual rainfall, 15.90in.).

April 5th.—Present: eight members and one visitor.

Mr. A. F. Herbert gave a review of the work done by his sons in connection with the school wheat plots. Following this a general discussion took place on the methods of harvesting adopted during the year, and the many difficulties that had to be faced. Mr. J. H. Nicholls said the question of the variety of wheat was of less importance than the condition of the land on which it was sown. Dart's this year had yielded up to 40bush., and whilst Eclipse had not yielded so well, it was capable of holding its own over a period of years. Mr. Herbert expressed a preference for Marshall's No. 3, Yandilla King, and Dart's.

### NANTAWARRA (Average annual rainfall, 15.90in.).

May 2nd.—Present: eight members.

Uniformity of Type.—In a paper under this title, Mr. E. J. Herbert made a plea for the maintenance of a uniformity of type amongst the stock of a district. In the case of cows, he said, the prevailing practice was to mate them with any bull that might be close at hand, regardless of the type or strain of the beast. He advised procuring a certain strain, and breeding from that, and by judicious culling and handling, a definite type would be established. The same applied to other lines of livestock. The combined marketing of produce, graded to a uniform standard, would be found profitable, and he suggested the embodiment of the best features of different makes into their implements.—Mr. J. H. Nicholls, in discussing the paper, thought most good was secured where there was a diversity of type, a view with which Messrs. W. Greenshields and R. N. Uppill concurred.

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### NORTHFIELD (Average annual rainfall, 19in.).

May 1st.—Present: nine members.

English Farming Practices.—An interesting paper dealing with some methods of farming and the rotation of crops in the west of England was contributed by Mr. Geo Hutchins, late of that part. The writer of the paper dealt in detail with many of the agricultural practices in England, and explained the nature of the crops grown, the methods of cultivation, dressings of manure applied, and various matters associated therewith. The paper was well received by members, and complimentary remarks were made by Messrs. D. Rowe, H. Goldney, E. L. Conole, F. Chardon, A Sandercock, and W. J. Dall.

### SADDLEWORTH (Average annual rainfall, 19.69in.).

Rotation Cropping.—The following paper was contributed by Mr. B. C. Klau:—"Owing to a considerable increase in the value of land and higher taxation those who are occupying comparatively small areas find that unless they crop their land with wheat every alternate year they have difficulty in making 'both ends meet.' I am of the opinion that we will have to produce more per acre than we have done in the past; those who crop with wheat every second year are doing this, but at too great a cost in loss of fertility of the soil. I admit that wheat is more suited to continuous cropping than possibly any other field crop, unless maize is admitted under favorable soil and climatic conditions. If potatoes follow potatoes year after year they become diseased, and only scabby tubers are grown; if rape follows rape, succeeding crops fail, and cow peas grown in succession become affected with worms and disease, and fail. Again, soil that is exhausted by wheat cropping will grow a good crop of oats. When wheat follows wheat certain fertilising properties in the soil are being exhausted, while others are wasted or used up by weeds, the land tends to become foul, and diseases like takeall appear in the crop. Our present method is right for a time, but as the soil loses its virgin fertility and fails to respond to good tillage, we shall need to adopt other methods. Farmers this year have said, 'What is the use of working the soil; the unworked land gave better results than the well-worked fallows; and anyway, how is the fertility of the soil to be kept up?' One way is by rotation cropping, and I will try to show how. (1) How this may be done—The rotation suitable for the wheat farmer is one in which wheat is grown alternately with a fodder crop; this means stock-raising. On small holdings of land, within a 20in. rainfall or over, crops may be grown each year, but this I do not support, because the land must be prepared in great haste, and possibly at an unsuitable time, success is too dependent on opportune rains just prior to seeding. The method I propose is that of growing two crops in three years, this permits of the stubble being used for stock feeding, and gives ample time for the preparation of the seedbed as well as allowing for the summer fallow to be in order for the autumn-sown crops. My course or rotation would be—First year, wheat; second year, stubble; third year, forage crops, these will include rape, a winter grazing crop, cow peas, a leguminous crop, and sorghum, a summer silage crop. These crops are merely examples to be varied as the farmer deems fit for his land and stock; the general principles of the rotation to be aimed at are—(1) That legumes (pod-bearing plants) be alternated with non-legumes; (2) that deep-rooting crops be grown regularly when possible; (3) that a crop suitable for conserving as silage be grown regularly, and an area reserved for it; (4) the rotation be arranged so that all autumn-sown crops are preceded by a summer fallow. The area intended to be under cultivation should be divided into three approximately equal portions; in any year one portion will be under wheat, a second in fallow, and the third under some crop other than wheat. The following table will explain the rotation:—

| Year. | Paddock. | Paddock. | Paddock |
|---|---|---|---|
| 1917 ............ | Fallow<br>Wheat | Stubble<br>Fallow | Rape, cow peas<br>Sorghum |
| 1918 ............ | Stubble<br>Fallow | Rape, cow peas<br>Sorghum | Fallow<br>Wheat |
| 1919 ............ | Rape, cow peas<br>Sorghum | Fallow<br>Wheat | Stubble<br>Fallow |
| 1920 ............ | Same as 1917 | | |

(2) The advantages gained by this rotation.—I have shown how two-thirds of the cultivated land can be advantageously cropped in one year—a gain over the present system of fallowing, which only allows of one-half or one-third of the arable land being cropped each year. Under the proposed rotation four crops are obtained in six years against three or only two under the old way. Two of these crops are fodder crops, but their value will exceed that of the single wheat crop, and fertility

of the land not so reduced. With the above rotation the first three principles governing a suitable course are observed by the inclusion of fodder crops. The value of such a rotation is further increased if the order in which the fodder crops are grown is changed. For instance, if rape is cropped one year, cow peas the next, and sorghum the third. Thus nine years would be occupied in cropping the whole area before the same land carries a second crop of the same kind. These fodder crops are only types; if they are not suitable the farmer should not grow them merely because in theory such may appear desirable. The object of growing these crops is to enrich the soil with nitrogen and add organic matter to it, and prevent the ground becoming sick. If this object is achieved the variety of crop is immaterial. It may be thought that the system outlined entails more labor and expense. Such is not the case, however. Under both rotation systems the land is ploughed once for the seed bed, but with this difference, that seeding operations are completed before the ploughing, instead of after. Under the proposed system the cost of ploughing is reduced to a minimum, because done when the weather is favorable and the soil in the best condition for such work. When ploughing has to be done first it is often delayed on account of want of rain, time becomes limited, and the work is done hurriedly, and possibly in a slovenly manner. The proposed rotation involves more work to the fallows, but this is generally acknowledged to be profitable work, and the ploughing is all done at the best time of the year. Any extra labor necessary is compensated for by getting the seeding done at the most suitable time, when it will start away, irrespective of an opportune fall of rain. At present the work of the year is crowded into seven or eight months, while under the proposed system the work is more evenly distributed throughout the year. The following calendar of operations will show this:—January, harvesting wheat for grain, working fallows; February, harvesting sorghum, working fallows; March, sowing rape, working fallows; April, sowing wheat; May, sowing wheat; June, ploughing; July, ploughing; August, ploughing; September, ploughing; October, sow cow peas and sorghum; November, harvesting wheat for hay; December, harvesting wheat for hay and grain, working fallows if suitable. The above gives full employment throughout the year, and is a step forward, as it is in the direction of securing better and more intelligent men as labor for agricultural work, and such men are now a necessity to handle the useful but expensive machinery for profitable wheat growing. The best class of men will not be induced to take up farm work if the most that can be offered them is work of a spasmodic character. I would like to sum up the advantages to be gained by this rotation method of cropping:—(1) The whole food supply of the soil can be utilised—not possible when only wheat is grown; some crops feed deeper than others, the surface feeders leaving stores of food unused. (2) The amount of valuable organic matter in the soil can be maintained, and even increased. (3) The free nitrogen of the air can be made use of. (4) Insect, fungus, and weed pests can be controlled or destroyed. (5) Provision can be made for the economical distribution of labor throughout the year.''

NORTHFIELD.—At the last meeting reference was made to the severe loss the Branch has sustained on account of the death of Mr. J. Williams, a foundation member, and Chairman of the Branch for a number of years. The feeling of members was fittingly shown by the presentation to Mrs. Williams of an illuminated address, expressing their sympathy, and high appreciation of the late member.

ROSENTHAL, April 4th.—Mr. S. C. Davis read a paper on the bulk handling of wheat, in which he discussed the problem at length.

SALISBURY, May 1st.—The business of the meeting consisted of a ''Question box,'' in which a number of questions were debated and decisions arrived at. It was agreed that portable engines were more suitable for farmers in that district than those of the stationary type.

TWO WELLS, April 11th.—Mr. J. R. Lawrie read a paper describing the methods adopted on the dairy farm of Mr. G. Lane, at Murray Bridge, which had been established on reclaimed swamp lands, though the buildings were on high lands above the reach of flood waters. The land could be flooded by gravitation, and the water was run off into the paddocks in drains and from the drains it had to be pumped back into the river. In addition to watering the land the magnesia in some of the swamp soil was in that way washed out, and lands which would grow nothing a while ago now produced good fodder grasses. Lucerne and maize grew wonderfully, the latter producing 60 tons to the acre. The whole maize crop was put into silos, which had a capacity of 500 tons. A special binder was made for the maize, which was carted to the silos, where a cutter fitted with a self feeder and elevator was in operation. The lucerne was cut with a mower and carted to the cows. In the milking operations the product of each cow at each milking was entered on a card hung up in the milking shed, and the yield of each cow was clearly shown. Mr. Lawrie also described what he saw on a visit to the Pompoota settlement.

WATERVALE, May 14th.—For treatment of black spot on fruit trees and vines Mr. Burgess suggested spraying with Bordeaux mixture.

## YORKE PENINSULA DISTRICT.

### (TO BUTE)

DOWLINGVILLE (Average annual rainfall, 13in. to 14in.).

April 27th.—Present: seven members and one visitor.

Rabbit Destruction.—In a paper on rabbit destruction Mr. F. Lock declared that since the advent of foxes the habits of the rabbits had changed somewhat, in that they assembled in larger warrens. The pest could be kept in check by establishing a rabbit week, once a year, say in the middle or end of February, when all the landowners should be compelled to take effective means to destroy the rabbits on their properties. Such an attack would take the rabbits more than a year to recover from. Men should also be employed on all Government lands in agricultural areas in the work of extermination on the same day. As to methods of destruction no doubt the poison cart was very effective, and thousands of rabbits could be killed by that means in a day. That, however, was not sufficient, because the holes and warrens should be destroyed. Digging out holes, unless they were small, was a very slow process, but where the holes were large and the land suitable for ploughing to a depth, if the holes were ploughed in deeply in the summer, not only were the homes of the pest broken, but many rabbits were smothered in the dust. If the land were ploughed to a depth of 16in., though some of the rabbits might scratch their way out, they did not seem to be able to do much harm. Mr. J. A. Phelps had tried covering rabbit holes with straw. He stuffed straw into the openings and then put a layer of straw over all. The rabbits did not seem to be able to work in the straw, and they were successfully blocked.

## WESTERN DISTRICT.

### CUMMINS.

May 5th.—Present: 10 members and two visitors.

Care of Machinery, Etc.—Mr. A. Fuss contributed a paper on this subject. A machine was not profitable, he said, unless it provided a reasonable return after the payment of interest and depreciation. As to the care of implements, the cultivator should have constant attention to working parts, any broken or worn bolts being replaced. The draught or the springs and bridles should not be unduly heavy. A small quantity of oil should be applied to the wheels daily. Any necessary repairs to drills should have been effected before the machine had been put away after the previous year's work. When the machine was to be taken out a general overhaul was necessary, seeing that the cogs were properly in mesh. If the shoes of disks did not operate directly underneath the distributors they damaged the tubes. When ribbon tubes became jammed disconnect the tube at the top, compress it, and turn as to wind up. It generally became loose in the shoe without further trouble. To oil poles and box before a seeding will help them to resist the winter showers; raw linseed oil penetrated well, and did not spoil the effect of the original paintings. Of course, when necessary, a coat of paint would be better. The pressure springs on disks were of little use in those districts, as they were not designed to have a compression of 9in. or so, which was often required. Binder chains and canvas should run at right tensions. Worn pitmans caused the crank bearing to jerk loose, and also broke the head off the knives if the race of the knife were worn or bent. The knotter was rather troublesome at times, usually the fault lay in the string. Too large a sheaf wore the packers and strained the binder. It was a bad practice to use resin on belts of strippers to prevent slipping, it gummed the belt, caused it to crack, and prevented slipping for only a short time. The use of castor or neatsfoot oil kept them pliable, and having the face of the pulleys crowned with leather gave better results. Gears that had a rapid motion should not be geared while travelling. All vehicles should be kept painted with good paint, and wheels well tired, and fowls kept off them. The paper then dealt with the care of engines on the farm, urging the wisdom of following the maker's instructions. A general discussion followed.

### KOPPIO (Average annual rainfall, 22.45in.).

May 5th.—Present: seven members and one visitor.

Agriculture and the War.—A paper under the heading of "The Effect of War on the Agricultural Industry" was contributed by Mr. F. W. Gardner. He referred to the heavy drain that enlistments had made on the number of farmers and farm employees, and dealt with the changes of the methods of handling and marketing produce that had been occasioned through the war. He closed with an appeal to every farmer to do his utmost to improve the methods of agriculture in the district, and so contribute toward the wellbeing of the agricultural industry. A lengthy discussion followed.

### MILTALIE (Average annual rainfall, 14.55in.).

May 5th.—Present: six members.

Varieties of Wheat Suitable to the District.—Mr. J. W. Story, in a paper on this subject, mentioned that the varieties of wheat cultivated fell into two classes, early and late. "One of the best-known wheats in this district," the paper continued, "is Federation. It is a late, slow grower, very prolific if conditions suitable, but it is only about one year in six that everything is suitable. Being a slow grower, on old ground the young weeds tend to retard its growth. If there is 'rust' about at all Federation is affected badly. It stands up well, and shakes easily if the sample is good. J4 is a well-known wheat, more rust-resisting, a faster grower, and shakes more quickly than Federation, seldom yielding a prolific crop. We have no wheats whatever that are rust-proof, except the Indian varieties Le Huguenot and Medeah, but they are not good for milling. Still, they make good hay if sown early and cut on the green side. Of milling wheats Golden Drop is the fastest grower we have. It is not very subject to rust, but very liable to shake; it will even shake before it is ripe. It also has a tendency to break off at the first knot. It is a moderate yielder. Marshall's No. 3 (late) yields a prolific crop of straw, promising a heavy yield of wheat, which the machines always fail to discover. It makes good hay if sown early on clean ground. Lotts (late) is a slow grower till spring; heavy yielder if conditions are suitable, is easy to thrash, but very susceptible to rust. Walker's Early is a medium yielder and grower. I have never yet seen it without it contained more or less smut. Of all the late wheats I prefer Yandilla King. It is a very slow grower till late in the spring. Thus on old land, where weeds are likely to come up, they grow the faster, and choke the wheat to a large extent, but for a wheat to sow on clean, or comparatively new land, it stands unrivalled. It is a heavy yielder, and stands up well. Although rust affects the straw badly, it never seems to affect the sample. It is rather tough for thrashing. I might add that it can stand a fair quantity of seed per acre. Gluyas is my favorite of the early varieties. If sown in June, with 1bush. of seed it yields a remunerative crop year after year. To sow it in April or the beginning of May is only courting trouble. Sown early, it grows tall and has to wait long for weather to ripen it. The straw being weak it goes down and often tangles. Rust does not seem to affect it at all, but hot winds will if they catch it at any critical stage. It makes very heavy hay. King's Early is a fairly quick grower, subject to smut, takeall, and rust. Marshall's Hybrid is a fairly quick grower, and very good yielder when everything is satisfactory for it, but it appears to me to be the worst wheat we have for takeall." The discussion was opened by the Hon. Secretary (Mr. W. E. Hier), who considered Yandilla King one of the best of the late wheats. It should be sown as early as possible. King's Early was the best early wheat for the Hills district. Mr. D. Bagnell favored Yandilla King, Gluyas, and Golden Drop; Mr. W. G. Smith, Federation; Mr. J. P. Story, Gluyas and Federation; Mr. E. Story, Yandilla King; the Chairman (Mr. L. J. Aunger), Yandilla King and German Wonder.

## MINNIPA.

March 10th.—Present: four members and two visitors.

**Sand Drift.**—Some of the causes of sand drift, observed Mr. F. H. Lovegrove in a paper on that subject, were (1) being unprotected from winds, especially from the north; (2) continued close feeding, through being heavily stocked; and (3) lack of moisture in drought years. Soil of a sandy, loamy nature was more subject to drift than the stiffer soils. If precautionary measures were not taken a fair percentage of the local land would have a tendency to drift as that and the adjoining hundreds became cleared, heavily stocked or intensely cultivated. To deal with a drifting area he recommended cropping it with rye, and cheaply fencing it to prevent stock, especially sheep, from running on it; the rye to be stripped and the straw left standing. The following season there should be a fair self-sown crop, well proctected by the last year's straw, that could either be stripped or the grain allowed to fall, and by the middle of the following season the land should have sufficiently recovered to allow of stocking with discretion, but he would not recommend the early running of sheep over such reclaimed areas. Marram grass or lupin had been grown to advantage, and both were of great value for reclaiming drifting land, but he preferred rye, owing to the very slow process of establishing marram grass and the small use to which the lupin could be put, it being practically valueless as a fodder. The farmer or man on the land generally did not take sufficient precautionary measures to effectively deal with sand drift in its earliest stages. Mr. G. V. Lindquist said that rye was a very light yielder and difficult to strip. Mr. A. Elfson was averse to more than three cereal crops in succession. He recommended a summer scrub weed, known as the "tomato plant" for checking sand drift. It was good feed for stock.

## SALT CREEK.

May 5th.—Present: eight members and one visitor.

**Settlement of Soldiers on the Land.**—In contributing a paper on this subject Mr. W. Lee, sen., suggested that a paper should be written by a member of each Branch of the Bureau on this subject, and these should form a valuable guide as to the cost of starting soldiers on the land. He also suggested that those men who had not had experience in agriculture should be encouraged to farm on shares in different parts. He submitted a rough estimate of the cost of starting an up-to-date farm; the total involved being £1,408. In discussing the subject, members agreed that the practice of share farming was very valuable in enabling a farmer to start. They expressed their willingness to assist any anxious to start in their district, and the desire that other branches should take up the subject.

## WARROW.

May 12th.—Present: five members.

**Sheep on the Farm.**—This subject was dealt with in a paper by Mr. J. J. Doudle, in the course of which he said:—"Every farmer holding any extensive area of land should keep sheep as well as grow wheat. When starting, the farmer should go in for the best, as the good sheep eat no more than those of the poorer class. He should get sheep of a good constitution. Sheep that are constitutionally weak are always a source of trouble to their owner, and have always a tendency to yield tender wool, and a few fleeces of tender wool in a bale will often reduce the value of the whole clip. For sheep of a large frame the demand is much keener. They will cut a better fleece, give a larger skin, and realise a bigger profit in the market. In all flocks, no matter how well looked after, there are always a few small and delicate which should be culled out and sold to the butcher or to provide meat for the home. Length of staple is the next consideration. It is not advisable to attempt to grow sheep with a dense fleece until the length is first reached. Wool of long staple will always bring better prices than the short, dense wool, as density will reduce the length. When length of staple has been reached as far as possible, then go for density, but never neglect the length for the dense wool. Once one has a good breed of sheep it is best to stick to that particular breed. The use of rams from different breeders will in time show in the progeny. For the market, taking all things into consideration, I favor the Merino. If properly cared for it will return more profit than the crossbred. The wool, in nearly every instance, brings a better price, and the sheep are much more easily kept in the paddocks.''

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### YADNARIE (Average annual rainfall, 14.09in.).

May 4th.—Present: eight members and two visitors.

Scrub Farming.—A paper under the title of ''Essentials in the Successful Occupation of a Scrub Block'' was read by Mr. A. A. Dreckow. In discussing the question the Chairman (Mr. J. H. Kruger) emphasized the necessity for giving consideration to the questions of transport and water supply. It was necessary to adopt the practice of fallowing to assist in the clearing of the land. In using the fire rake, if the work were done against the wind a much better and cleaner job was the result. A good wide rake was better than a narrow one. As a general rule, a beginner would find it well to restrict any side lines during the first year or two to a few fowls and pigs. Mr. A. Spriggs suggested that a dam should be constructed in the centre of the block if a catchment were available, and the house placed close to this.

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KOONIBBA, April 12th.—A paper dealing with the various methods of harvesting wheat was contributed by Mr. R. Schultz. As a result of a lengthy discussion the general opinion of members was that the harvester was the most suitable machine for that district at the present.

PENONG, April 14th.—A general discussion took place on the question of burning stubble, and members generally considered that by burning stubble the germinating power of the greater part of the grain lying on the ground would be destroyed.

PENONG, May 12th.—Mr. J. Stiggants introduced the question of ploughing and drilling stubble land as against drilling only, with particular reference to the present season. He advocated using the plough under present conditions, as the soil was well soaked. He thought it would be payable to curtail the area sown, rather than to drill in a larger area without ploughing. The consensus of opinion favored the views of Mr. Stiggants. A general discussion then took place on the question of pickling wheat.

## EASTERN DISTRICT.

## (EAST OF MOUNT LOFTY RANGES.)

### BOOKPURNONG EAST.

May 5th.—Present: 15 members.

Mr. W. Hammond delivered an instructive address on the best wheats for this district. He mentioned that those which had been most satisfactory on his holding were Walker's Wonder, Yandilla King, Silver King, and Gluyas. In the discussion which followed the majority of members favored Marshall's No. 3, with Yandilla King, Silver Baart, Walker's Wonder, Dart's Imperial, Budd's Early, Steinwedel, and World's Champion closely following.

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### BORRIKA.

April 27th.—Present: 13 members and five visitors.

Mr. Perriam (a visitor) opened a discussion by giving his experience in seeding in the mallee country. The sandy country he would not work too much. He believed in fallowing, but would not plough for immediate sowing. He preferred the disk cultivator when preparing land for immediate sowing, and he would rather ''just drill' the crop in. He mentioned several instances in support of his contentions. If sandy land were worked much it required packing to form a good seed bed. He mentioned a farmer at Geranium (Mr. Norton) who ploughed his land and harrowed and then cross-harrowed it, thus making a firm seed bed, and that farmer always secured good crops. On firm land ploughing was to be recommended. In the discussion which followed Mr. E. H. Huxtable agreed with Mr. Perriam. He mentioned that land which he had ploughed and worked well was his worst in respect to yield; where he had only cultivated before the drill, was far superior, but his fallowed land was the best of all. Mr. Green's experience was that ploughing gave best results. Mr. Hart had ploughed portion of his land last season, and although that was done late, he had the best results from that land. Mr. J. B. Tonkin asked if a crop sown on stubble land fallowed would be likely to be affected with takeall. Mr. Perriam said he did not think so.

## COONALPYN (Average annual rainfall 17.49in.).

April 6th.—Present: six members and one visitor.

**Types of Cultivators.**—Mr. J. Cronin addressed members on this subject. In defining the most suitable implement he said it must do good work, have an independent jump, run light, wearing parts must be few, and of the highest quality material. Price should be a secondary consideration. Many of the cheaper class of cultivators soon found their way to the scrap heap. His preference for the district was the stump-jump twin cultivating plough. Then would come the disk cultivator, and after that the tyne implements. He considered the spring-tooth cultivators not suited to the district yet. Mr. Wall also preferred the skim plough. He contended that where the fallow had just the one working prior to seeding it was necessary to turn the rubbish under. Mr. Venning said the disk cultivator was the best type for the district at present, as there was no choking with rubbish. There was, however, a use for every type of machine, it depending altogether on what state the fallow was in. Mr. Tregenza said one could not expect any cultivator to make perfect work on bad ploughing. The most generally useful implement for the local fallow would be a spring-draft tyne cultivator with ample clearance. If weeds were kept down by sufficient use of this implement it would not be necessary to skim-plough the fallow at seeding time, and better returns would follow.

**Feeding Horses.**—Mr. Wall spoke on "Feeding Horses." His motto in feeding was "good and plenty.' He would let the working horse have as much as he would eat. Young horses were better fed solely on hay—any rubbish in the hay then was left out. If feeding chaff oats should be added. As a food for working horses, nothing surpassed oats. Care should be taken to vary the food at times, Green feed of some description was essential. Cocky chaff was not of much value, and no more than sufficient roughage should be put before the team horse. No amount of good feeding would counteract the harm done by habitually working horses after sundown. Mr. Pitman said it was possible to give a horse too much food. There was little waste with hay if horses were tied up while eating. Mr. Venning said good cocky chaff was most valuable, and with proportions of bran, pollard, and oats, made a splendid ration. Mr. Wall, replying, said many horses showed need of less whip and more feed.

## HALIDON.

May 2nd.—Present: 11 members and two visitors.

**Finance of the Farm.**—A paper under this title was read by Mr. von Doussa. He referred to the unfortunate fact that the first crop put in by settlers along the Brown's Well line met with a year of drought, and the consequent high price of feed and seed for the following seasons. A reserve fund should be built up by every farmer, and he should also not neglect to provide a reserve of fodder for his stock. He urged the wisdom of keeping a set of accounts, to enable him to ascertain his costs of production, and also to arrive at the profitableness or otherwise of his undertaking. Members generally agreed with the views expressed by the writer of the paper.

**Harvest.**—The last harvest results were discussed. It was generally found that the heavier dressings of superphosphate were responsible for the heavier yields; the average dressing in the district was about 60lbs. per acre. Late-sown crops yielded best, which was unusual. Bobs and Yandilla King were the heaviest yielders.

## MANTUNG.

May 3rd.—Present: five members.

Consideration was given by the members to the results of the experimental plots which had been conducted by the Branch during the year. These were as follows:—Manurial test—One-acre plots, 40lbs. graded Yandilla King per acre. Results—(1), No manure, 13bush. 2lbs.; (2), 56lbs. super., 15bush. 14lbs.; (3), 84lbs. super., 16bush. 48lbs.; (4), 112lbs. super., 16bush. 18lbs.; plots sown May 16th; rainfall on plots, 13.68in. Wheat test—One-acre plots, 50lbs. seed and super. per acre. Results—(1), Yandilla King, 16bush. 44lbs.; (2), Golden Drop, 14bush. 49lbs.; (3), Pioneer Purple, 13bush. 25lbs.; (4), Red Russian, 18bush. 22lbs.; (5), Federation, 14bush. 47lbs.; plots ploughed in April, and sown on May 8th; rainfall on plots, 13.77in. Manurial test on sand; wheat test on grey loam.

## MONARTO SOUTH (Average annual rainfall, 14in. to 15in.).

April 28th.—Present: 13 members and three visitors.

Dipping Sheep.—The best time to dip sheep, remarked Mr. E. Tilbrook in a paper on that subject, was six or eight weeks after shearing. The dip should be about three parts full of water. The sheep should be yarded the night before in order that they might go into the bath cool and with empty stomachs. The dip powders should be mixed with rain water in a tub, poured into the bath, and well mixed before putting the sheep in. That operation required two men, one to put the sheep in and the other to push them under the water twice, with a two-pronged fork, with the ends turned outwards, so that if a sheep got the wrong way it could be easily turned. The sheep should not be hurried out of the draining pen. In the discussion Mr. Tilbrook explained that by yarding the sheep the night before dipping they would not foul the bath by droppings in the draining pen. Members agreed that it was better to dip in cool weather, because the sheep would then move about, whereas in hot weather they stood in the shade, which was not good after dipping.

Hints to the Farmer.—All implements, said Mr. V. Braendler, in a paper giving hints to farmers, should be thoroughly overhauled after using, ready for the next season. Coatings of paint were also advisable, and the machinery should be put into a shed to prevent the weather affecting it. All scraps of iron, &c., which were frequently thrown about could be utilised for bolts, and repairing implements, &c. The horses should have the best attention and care in regard to their feed, not only when working, but before that time arrived. Grooming should be carried out thoroughly, and horses should not be worked with a sweaty coat. When an animal was suffering from a sore shoulder it was advisable to cut the collar and so ease the trouble. Stables should be cleaned out every morning, and straw should be put in for bedding. Special care should be taken to see that the collars fitted well, and each horse should have its own harness, and a separate peg should be provided for each horse's collar and winkers. All working harness should be thoroughly cleaned and oiled twice a year to prevent it becoming hard and perishing. A straw stack should be put in the paddock after harvest in order that the stock might take shelter behind it on a cold wet night. Members generally agreed with the paper.

## MYPOLONGA.

May 2nd.—Present: 13 members.

Manuring Orchard Trees.—This subject was dealt with in a paper by Mr. S. W. Gray, who after dealing with the chemical structure of the tree, mentioned that in manuring the main point to be considered was that the slightest shortage of any one of the food constituents in the soil had a determining effect on the growth of the plant. "Roughly," the paper continued, "98 per cent. of plant food comes from the air and water, the other 2 per cent. we must get from the soil. Briefly, they are made up as follows:—Nitrogen, iron, lime, magnesia, potash, soda, and sulphuric, hydrochloric, and phosphoric acids. It is when the soil becomes deficient of these that we must come to its aid, and supply the shortage. That is what we call manuring. Now, of those nine substances we find that only four or five figure to any great extent in the fruit and frame of a tree; the others would be quoted in the analyses as only a trace. We are, then, finally brought down to four main plant foods, and this is what I want you to remember as the four guiding principles of manuring. First.—Nitrates, which promote growth, and can be seen in the healthy green leaves, the large and vigorous growths, and if overdone, in coarse rank shoots, all wood and no crop. Second.—Phosphates, which promote fruitfulness, early ripening, and are most important in the soils of South Australia. Third.—Potash, which promotes the quality, the store of sugar, and general flavor that we all want our fruit to have. Fourth.—Lime, which assists in the formation of solid wood and strong branches, and is of great assistance in sweetening the soil and making the former three substances into root food. Now, these foods to be of use to the tree must be in such a form that the roots can take them up, and must therefore be in a soluble form, either in water or in the slight acids of the soil and root juices; the more soluble the quicker the tree feels the benefit. For example, take bonedust and superphosphate. With bonedust the soil acids and root juices slowly make available the small particles of crushed bone; superphosphate, having been treated with very strong acids before it comes into contact with the soil moisture, is much more readily available. I have endeavored briefly to show what foods are needed for tree life, and why they are so needed. Let us now see where and how we can get them, and what is the cheapest and best way to apply them. Amongst the most effective means of adding nitrogen to the soil is the application of vegetable matter in the ploughing in of green crops, or green manuring. This can best be done by the planting of leguminous crops. The growth of legumes actually increases the quantity of nitrogen in the soil; but if these legumes are ploughed into the land at the right season, they add to the land about 100lbs. of nitrogen per acre. Now this is equal to 4cwt. of sulphate of ammonia, or 8cwt. of blood manure, so should be well worth the work entailed. Tares, vetches, cow peas, lupins, or clover are to be recommended. Now, added to the nitrogen supplied by this means of manuring is the humus that is supplied to the soil as the greens decay. The best mode of procedure is to first roll the crop, then cut it up with the disk implement, and plough it in deeply. Farmyard Manures.—Stable or horse manure is rather better than cow manure, but we may assume that the average well-rotted sample would contain about 10lbs. of nitrogen, 10lbs. of potash, and 4lbs. to 6lbs. of phosphate. The best way of treating this valuable manure is to have a compost heap. This is simply a heap of layers of earth and refuse material—animal or vegetable, leaves, sawdust, weeds, prunings, &c., dung, bone, or animal muck—covered with earth, and then another layer of refuse, earth, &c. This should be kept moist, and allowed to rot for about six months. It is then ready for use, and as well as being valuable as a manure, is particularly valuable on account of the humus it contains. The larger prunings from vines or trees should be burned, and the ashes sprinkled in the orchard near the trees; they contain valuable nitrates and potash. Should the stable dung or green manure be unobtainable, or if our trees show us they require more of either potash or phosphate, we, of course, must go to the chemical manure.'' The writer of the paper then detailed the recommendations made in the *Farmers' Handbook* of New South Wales for manuring different trees and crops.

## POMPOOTA.

May 16th.—Present: 35 members.

An interesting address was delivered by Mr. F. C. Grace on ''Milk and its Composition.'' Following the address a demonstration on the use of the Babcock tester was given by Mr. Grace, and by taking the morning and evening's milking from 12 cows, the difference in the quality of the respective milkings was demonstrated.

## POMPOOTA.

May 23rd.—Present: 23 members.

ANNUAL REPORT.—The report of the year's work of the Branch was read by the Hon. Secretary (Mr. H. H. Orchard). After referring to the assistance rendered the Branch by visiting lecturers, the report showed that 13 meetings had been held during the period under review, the average attendance being 31.

## RAMCO.

May 7th.—Present: 10 members.

Raisin Drying.—A discussion on drying raisins was introduced by Mr. F. G. Rogers. In ordinary seasons, he said, fruitgrowers on the Murray could depend on drying their fruit by sun heat, but this year seemed one of the exceptions, when artificial heat would be necessary in order to complete the drying in many cases. Some 10 years ago they had a similar season, and in Renmark many growers had to resort to roughly-made evaporators. All that was done had been to adapt some suitable shed as an evaporating house. One grower had used his cutting shed. He had nailed hessian around it, packed the space between the wall plates with hessian, and given the whole three coats of whitewash. The vapour escaped at the ridge cap. He inverted a sweat box, on which to stand the trays, and stacked trays around the shed and one row down the centre, the whole holding 2,000 of the small trays. The five bottom trays he put the ordinary quantity of fruit on, because the drying was worst at the bottom, but on the rest of the trays he double-banked the fruit, the top trays being covered with an empty tray. The heat was obtained by 10 oil drums, each standing upon three bricks. The drums were lit in the open air, filled with charcoal, and when well alight taken in the shed. After 2½ hours it was necessary to renew the fires. The aim was to keep the temperature at 150deg., remove drums to lessen the heat, and in about 24 hours the fruit was sufficiently dried. If the fruit was only three days from the dip it was best not to double-bank on the trays. He thought in a season like this many growers could easily utilise a shed to finish their drying and save them worry. A good discussion followed. Mr. Odgers said that in 1906 he knew many growers in Renmark had adopted some such artificial heat for finishing the drying of their fruit. With present methods of rack drying and the greater distillery facilities growers might not so much need to resort to artificial drying.

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## RENMARK (Average annual rainfall, 10.93in.).

April 26th.—Present: 21 members and one visitor.

Prunes.—The following paper on the prune was read by Mr. J. M. Smith:—This paper does not pretend to be an exhaustive study of the prune in general, but merely records my experience in trying to grow one or two varieties of this fruit. I believe that no fruit is more widely grown or in such quantities. It flourishes in Central and Southern Europe, and also in the U.S.A., both with and without irrigation, and there seems no reason why it should not thrive and bear profitable crops in the Murray irrigation settlements. I can recall at least three considerable areas planted in Renmark in its early days, and although the trees grew well, I do not remember ever to have seen any product from these orchards, which have long since been rooted up. In looking back on our experience with the Zante currants and sultana one may fairly conclude that the prune had not a fair trial, and had it been persevered with, as were those vines, satisfactory results might have been obtained. About seven years ago, having a piece of ground that would take about 50 trees, I decided to plant some prunes, and secured 20 trees of Prune Splendour, 10 Prune D'Agen, and 20 Coe's Golden Drop, understanding that it was desirable to include this variety in a prune orchard for the purpose of cross pollination, and knowing that there was a market in Adelaide for the fruit dried. The soil is a red loam, averaging about a foot in depth, and covering a layer of hard pan varying in thickness from 1in. to 6in. The holes for planting the trees were all sunk well below the hard pan. The trees were planted 18ft. apart, and made growth from the start. For three years they were cut hard back in the winter, since when they have had very little pruning, and have developed into fine vigorous trees. In the fourth year the prunes bore a very promising crop. In the next year—(1915)—the bad year for most fruit crops, they also failed. They bore well last year, but this year only moderately. The Coe's Golden Drop have been disappointing. In the first place only 12 of the trees were true to name, and they have proved to be very shy bearers, and I imagine are not fulfilling the purpose for which they were planted, as they are a week or 10 days later than the prunes in flowering. The fruit is fine and large, and for drying when ripe should be dipped in boiling lye (about 20 to 1) spread on trays, and put straight into the sulphur house, and sulphured to about the same extent as for dried apricots or peaches; and then put in the sun to dry. When finished it makes a fine attractive looking fruit, but it is by no means a prune. The Prune Splendour is one of Burbank's productions, and is a cross between the Prune D'Agen and Pond's Seedling. It bears a fine, large, dark purple fruit, which ripens early in February. Gathered and placed on trays in the shade until wilted past all danger of sun blistering, it will dry without dipping or pricking, and when finished off makes a very handsome and fine-flavored prune. The Prune D'Agen ripens late—about the end of February—and to ensure drying in reasonable time requires either dipping or pricking. I prefer the latter, having found, as a rule, that the dipped fruit has a rather rusty appearance when dry. To finish them off and give the dark glossy appearance it is necessary after the fruit is dry and evened up in the sweat box to first wash it in boiling water, and after draining dip in a syrup, which may be made in many ways. The following is a syrup that will give satisfactory results, and is perfectly wholesome:—10lbs. prunes, 5lbs. sugar, 2ozs. salt, boiled in 20galls. of water. When the ripening period approaches every high wind will bring down a quantity of fruit. This fruit is worth picking up, as a rule, and putting out to dry in the usual way. It is a good plan to go round the orchard about once a week at this period and shake off the ripe fruit on to hessians. Many years ago, in conversation with the Hon. T. Playford, who had just returned from England by way of America, the subject of fruitgrowing was touched upon. He said one thing that had made a great impression on him was the enormous area of land on the Pacific coast devoted to prune growing. There is little doubt that we should be able so to prepare our fruit as to give satisfaction to the trade if we can only get the trees to bear. This may perhaps be achieved by judicious pruning. Last year my Prune Splendour averaged 6lbs. dried fruit to the tree, and the Prune D'Agen 19lbs. per tree. The market price rules somewhere about 8d. per lb., and with 120 trees to the acre the Prune D'Agen would give a fair return.—The reading of Mr. Smith's paper evoked a general discussion on its subject. The Chairman (Mr. Basey) remarked that Mr. Smith was not the only Renmark grower who had been badly treated by nurserymen. Members generally were eager for information about the sugar prune, of which there are apparently no trees in bearing in Renmark. Mr. Taylor was very hopeful that the sugar prune would prove well adapted to river conditions. The fruit was not of the finest, but coarse-grained and large-stoned, but the sugar content was very high, and it had the reputation in California of being a very heavy bearer. It had also the advantage of being an early ripener. Trees of this variety were planted in Mildura some 13 or 14 years ago. He had not seen these, but they were reported to be bearing well. A larger experience of the Splendour was needed to prove its adaptability to the conditions of the irrigation settlements, but Mr. Smith's experience of this variety was not encouraging, and it was significant that down-country growers were reported to be now fighting shy of the Splendour, on account of its light-bearing habit. A few years back this variety was prime favorite on account of its excellent quality and its early-ripening character. Mr. Kidd stated that a successful prune grower in Mildura had advised him to plant the Prune D'Agen, Sugar Prune, and Prune Splendour. Mr. L. Pitt said he had a number of Prune D'Agen trees, but got very little from them. There was no other variety planted with them, but failure to bear could not be for lack of facilities for cross pollination, inasmuch as the trees failed to flower. Mr. Taylor said that although Mildura experience of the prune had been very similar to that of Renmark in the early days—most plantations failing to produce profitable crops—two prune orchards in that settlement had yielded very handsome returns over a long period of years. In one case the trees were planted on stiff bluebush soil and in the other in a rotten bluebush hollow, where the soil was heavy but very fertile. In the former case the prunes were all of the D'Agen variety, with a few trees of (he believed) Coe's Golden Drop, which probably aided the setting of the fruit. In the second case (Mr. Faulkner's) the trees were of the D'Agen and Fellemberg varieties. Fourteen years ago Mr. Faulkner told him he was making £50 an acre from his prunes, and when he last visited Mildura the same gentleman assured him that he was taking £80 an acre off his Prune D'Agen and £100 an acre off his Fellembergs. At that date none of the trees had been cut back for 12 or 14 years. Hard pruning was undoubtedly one of the early reasons for the unfruitfulness of the prune on the river. He was personally acquainted with one plantation of Prune D'Agen in Mildura the trees of which always flowered prodigiously, but only bore very occasional crops until the place was sold to a man who let the trees go without pruning. He had been rather surprised to find from the latest edition of Wickson's California Fruits that, in spite of the many improved varieties of prunes introduced of late years, the French Prune D'Agen was still prime favorite with Californian growers. Mr. Petersen said he know one tree in Renmark which always bore very heavily, and Mr. Taylor said that Mr. W. R. Lewis, of Gurri Gurri, had had similar experience. The Fellemberg was undoubtedly a good prune for the river. Both Mr. Smith and Mr. Pitt had found the dipped prune dry as quickly as raisins, and Mr. Basey said that the Splendour appeared to dry very well on the tree. Mr. Smith said this was so; he found it quite unnecessary either to dip or prick the fruit of this variety. Samples (a carton of each) of his French and Splendour prunes and of Coe's Golden Drop dried plums were tabled by Mr. Smith. They were all of fine quality, though the D'Agens lacked somewhat in blackness of color, and he was heartily congratulated on them. The Splendour—large, fleshy, and jet black—was especially admired.

## ROSY PINE.

May 2nd.—Present: 14 members and one visitor.

Pigs on the Farm.—A paper on this subject was contributed by Mr. J. F. O'Loughlin, who expressed a view that these animals should form a part of the livestock on every holding, and he recommended purchasing from a breeder of repute. The sow should be of the Berkshire breed. Suckers should be reared to an age of eight months. They should have a first litter by Berkshire boars, be given a spell of, say, three months, and mated with the Middle Yorkshire. The sow that was about to farrow should be put away by herself, be given some clean, dry straw, and be fed lightly. After a successful farrowing the boar should be put in with the sow without loss of time. When rearing young pigs it was necessary to be particularly careful that they were not allowed to become hungry. Porkers should be fattened to about 60lbs. or 70lbs.; baconers, 120lbs. to 180lbs. The man who was disinclined to breed these animals was best advised to purchase stock six weeks old. In discussing the question Mr. L. Vaughan recommended feeding soaked oats to pigs. Mr. Lee thought the animals could be profitably reared when allowed grazing. Mr. Hay considered that pigs being bred for the fat market were better sty fed.

## WYNARKA.

May 5th.—Present: 15 members and two visitors.

How to Make Farming Pay.—Mr. A. W. Lawrie contributed a paper under this heading, as follows:—"When I came up here a few years ago, I thought that all we needed to do in the mallee country was just to scratch the land over a little and drill in the wheat and get a big lump of land in. This kind of cultivation might do for the first crop of new land, where it had had a good burn over it, but I have come to the conclusion that it is much better to cultivate the land well, and put less in. Scratching the land in year after year will not pay. I do not think we ought to crop our land with wheat for more than two or three seasons in succession. If it could be done, I would advise two crops and then a rest for one year. Plough the land not more than 2½in. or 3in. deep when ploughing to put in the crop at once. Before drilling in the wheat go over the land with a cultivator of some kind or harrow it, and then the drill will cover the seed much better. I also recommend harrowing after the drill. Forty pounds of wheat and 60lbs. of super. per acre is about the right quantity to use. Fallowing ought to be done as soon after seeding is finished as possible, and not later than the middle of September, as it is likely to be getting dry by then. Plough say 4in. or 4½in. deep, and if any weeds come up on the fallow, it should be scarified or harrowed; but better still, feed it down with sheep. Every farmer ought to grow his own mutton, and it would pay to have, say, 20 acres of land sheep-proofed and divided into, say, four paddocks of five acres each, and put it in with oats or barley. This would carry probably 30 or 35 sheep. The sheep could be changed from one paddock to the other, so that would give the stuff a chance to grow. Every farmer should have a few pigs, also fowls, and a cow or two. Experience has taught me that to be successful one must work the land well, not be too anxious about putting in a large area, but whatever one does should be done well, and with an average season farming will pay."

BERRI, April 10th.—Mr. F. Arndt continued his paper on experimental irrigation, showing the great need which existed for continuous experiments. In discussion members recognised the need of the experiments, but expressed the opinion that they should be undertaken by the Government, because they were too costly for private individuals.

LAMEROO, April 7th.—Mr. R. A. O'Connor delivered an address on the bulk handling of wheat, dealing with the question from a farmer's point of view.

MURRAY BRIDGE, February 26th and April 2nd.—At the meetings held on these dates Mr. D. F. Laurie, the Government Poultry Expert, delivered addresses on the general purpose fowl, and raising and feeding fowls.

MYPOLONGA, April 4th.—Mr. Muspratt delivered an address on horticultural matters, which was very well received.

ROSY PINE, April 11th.—Mr. Lee reported on the experimental plots; the crop was very light.

## SOUTH AND HILLS DISTRICT.

### CLARENDON (Average annual rainfall, 33.67in.).

May 7th.—Present: seven members and one visitor.

Sheep on the Farm.—"I was asked to write a paper on sheep as scavengers on the farm, but admitting that they help to keep the weeds and rubbish in check, I do not approve of the policy of starving the sheep to make them do the work the team should do," said Mr. A. Phelps in a paper on this subject. Sheep were no longer looked upon merely as a sideline in farming in the hills. The question which confronted the smaller holder was, would it pay to establish a flock at the present prices? He said, emphatically, yes. If they had to pay, say, 35s. for a good ewe, the lamb and fleece would about return the amount the first year. As the class of sheep required was almost unobtainable at the present they must resort to breeding. The basis of the flock should consist of South Australian Merino ewes, and cross these with the Longwool breeds in English Leicester, Lincoln, Border Leicester, and Romney Marsh. The Lincoln-Merino cross seemed to be the most popular in that district, owing to its large frame and heavier fleece, which was transmitted to its progeny; but as it was slow to mature, and the carcass was coarser and inferior in quality, it was unsuitable for export. Its large head, also, increased the danger of losses at lambing, especially with young ewes. He expressed a preference for the English Leicester-Merino Cross; then, having decided to raise fat lambs, one could cross with the shorter-woolled animals, Southdowns, Shropshires, or Dorset Horns, preferably the first-named. When replenishing the flock, one should go back to the long-wool or Merino rams, to keep the flock and wool of a uniform type. Fodder crops should be grown for the ewes and lambs. Lucerne, early-sown rape, rye, Cape oats, in rotation made good fodder. None of the culls, especially of the short-woolled type, should be retained. The lambs should be tailed at six weeks, a sterilised knife being used, and care taken to see that they were not turned into a dirty yard or with the flock. They should be kept on their legs, and should have their mothers when turned into the paddock.

Exhibit.—Mr. H. C. Harper tabled a long red mangold, grown on land that had produced, in addition to the mangolds, two crops of green fodder within 12 months.

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### HARTLEY (Average annual rainfall, 15in. to 16in.).

April 4th.—Present: 12 members.

Visit to Victoria.—In a paper dealing with a recent visit to Victoria, Mr. F. Lehmann said that in that State the reaper thresher was more in use than in South Australia. It was claimed that it ran more straightly after the team, and would deal well with rubbish and work in damp weather, besides making a splendid sample. In the rougher mallee country where the stripper was used the motor winnower or horse treadle winnower was used. In filling the bags the patent bag filler was in common use, and the bags could be quickly filled to bursting point. The wheat was weighed over a weighbridge, and the farmers were satisfied with the weight. Oats were largely sown as a rotation crop to prevent takeall. He saw a stack of oaten straw that had contained 700 bags of oats. It had been threshed by a thresher which required 14 men to work it. A smaller stack had been threshed by a reaper thresher, requiring only five men to work it. The latter machine did equally as good work as the larger machine. That type of machine would suit that district if it were not quite so cumbersome, having a 9ft. cut, which was too heavy for that locality, but would be very useful to thresh oats, barley, or wheat and put by the straw for fodder during droughts. In the district he visited there was a large distribution of water by open channels to supply farmers with water. The farmers received their supplies in dams from 1,000yds. to 2,000yds. capacity, and most farmers had a windmill erected at those dams to supply house and garden with water, and it was a pleasure to see the flourishing fruit trees and vegetables grown as a result.

Building Haystacks.—The first essential in building a haystack was to procure some nice handy forks, remarked Mr. F. Pope in a paper dealing with that subject. A bad fork meant less work, and that was unprofitable. The best place for a haystack was on level ground. If that could not be found it would be necessary to build two or three layers higher on the lower side. That would keep the stack from settling down the hill. Old posts or boughs made a good foundation, but a good pile of straw was better, since it tended to keep the rats and mice out. A fork should be used to build with. It was better than the hand, and it was not necessary to tread the outside sheaves. In building it was inadvisable to work all round the stack, but the operation should proceed from side to side. All the sheaves should be laid the same way, straight across the stack, binding the layer on the opposite side with the butts, taking care also to bind the ends well. The middle should not be made too high until roofing was commenced, and then it could be filled up. In commencing the roof one row should be laid out about 6in. to run the water off. Then, by binding with the butts the outside sheaves could be given a good dip, sufficient to keep out a winter's rain in most seasons. It was inadvisable to build too wide, and it was a better plan to build higher or make the stack longer. If the stack were a small one and run up quickly the walls should be fairly straight, because they would give out as the stack settled. If the stack were a large one it would be as well to give it the outward leaning desired, because it would remain as made, except that the ends would squeeze out so that it would be necessary to be careful not to allow them to project too much.

### MOUNT BARKER (Average annual rainfall, 30.93in.).

April 4th.—Present: 40 members.

Sheep.—After setting out that "sheep" was too large a subject to be dealt with exhaustively in the limits of his paper under that heading, Mr. O. P. Lines said that he would restrict his remarks to two classes, viz., Merinos and a cross for mothering lambs for "freezers." There were, he said, several types of Merinos, viz., Tasmanian, New South Wales (known as the Vermouth), Victorian (known as the Wanganella), and the South Australian plain body. The two former were almost identical, carrying a fine quality of wool, very dense, usually short in staple, and a carcass on the small side, covered with wrinkles. Sheep carrying excessive leather did not thrive as well as the plain bodied animals, and the wool being fine taxed the constitution to keep up the supply of yolk. Fine wools generally carried more yolk than coarse, and when hardships came, as a drought for instance, they had dead yolk and tender fibre as a result. The Victorian Wanganella recently introduced into South Australian flocks was a very attractive sheep, and carried a nice quality wool, good staple, evenly distributed on the carcass. They were slightly more wrinkled than the South Australian plain bodied sheep. As a result of breeding sheep with excessive wrinkles many fine and tender wools had been produced. In breeding Merinos he recommended the "plain body." They carried a coarser wool, but coarser wool meant stronger constitution, and where sheep had to rough it somewhat, constitution was the first consideration. They were more largely framed, big boned, and having coarser wool must of necessity have coarser skin. But the strong, bulky, coarse wools were always eagerly sought after, and commanded a high price, because when scoured they gave a higher percentage of wool. In purchasing for breeding he recommended the selection of ewes with not more than two folds on the neck, large frames, and carrying a nice even fleece with plenty of bulk. Having selected ewes of that description he could not attach too much importance to the selection of the ram. In all cases it was wise to know a sire's breeding for at least two generations, because some animals were very attractive to the eye, without any breeding at all, and when used have disastrous effects on the flock. In that way years of care were wasted. A good sire with an even bulky fleece would build up the flock with bulk, and in the laws of nature ewe lambs followed the sire. Afterwards, if weight were required, a weighty woolled sire with plenty of lustre should be selected. In purchasing a sire £1 or £2 in price should never be considered, because a good one was cheap at £5, whereas a mongrel was dear at a gift. Under those headings, with a little care he had seen a flock raised to such a degree that two years ago 500 of them returned 16s. per head in wool alone. In breeding a mother for lambs to freeze it should be remembered that Mount Barker was too wet for Merino sheep, generally speaking, and as the holdings were small it was essential that the flocks should be restricted to a certain number, excepting in the spring. A lamb usually could be bred for half the cost it could be bought, and with a little feeding in winter and a fair lambing the flocks could practically be doubled for the period mentioned. The question then was what were they going to keep? He recommended a Comeback in the opposite way to that usually adopted. In selecting the breeding ewes for the farm regard must be had to wool production, although mutton was a big factor, and therefore the Lincoln-Merino cross was the ideal for wool and mutton combined. A pure Lincoln ewe (or as pure as possible) should be selected, with large frame and well covered, and should be mated with a large-framed Merino ram, with plenty of quality, good staple, and robust constitution. The ewe lambs resulting from that combination should be kept for breeding, but any bad wools should be culled out and sent to market. Those which were retained should be mated to a Merino ram such as described above, and they would have to all appearances a Merino, hence a wool producer, carrying a bulky, weighty fleece, which would comb between 56 and 60—a wool fairly rushed by buyers, and commanding the highest prices. That class of sheep was practically a New Zealand "Corriedale," and all knew how their wool and mutton were sought after. He preferred that cross because the Lincolns were the coarsest and largest of the English breed, the latter playing an important part in the size of the ewe lamb which they were now considering for a mother. Those mated to a Shropshire ram produced an ideal lamb for "freezers." The Leicester carried a finer fleece, but the cross with the Merino in the former case produced a finer fibre, and still retained the size of the Lincoln. In a district with over a 20in. rainfall it was advisable to keep the Lincoln-Merino cross; if less than that rainfall Merinos would do better. A hard and fast rule could not be presented; for instance, if the climate were mild and pastures hilly and well drained the rainfall might be raised an inch or two. In the discussion which followed members were unanimous in their agreement with the views expressed in the paper, which they declared were ideal for that district.

## MOUNT BARKER (Average annual rainfall, 30.93in.).

May 2nd.—Present: 52 members.

FENCING.—The following paper was contributed by Mr. Hollamby:—Throughout the Hills districts, where mixed farming is the rule, it is essential to have good fences, especially boundary fences. Our first consideration is to ascertain the length of the fence to be erected. Then, to find out the nature of the land over which the fence is to be erected. If swampy, stony, or sandy, this makes, or should make, a considerable difference in the class of timber to be used in the fence. We will suppose, for instance, that it is mostly fair agricultural land, with an occasional stony ridge, and a creek to be crossed. Having red, blue, mountain gum, and stringybark, all of which are used in the hills, to select from, I take blue gum, as I have noticed that red gum is more often affected with dry rot, and consequently will break off at the surface when so affected fairly readily. If you take red gum, avoid timber that has been rung any length of time, or young, sappy stuff. For splitting you need a good maul and set of wedges. Keep powder as far away as possible, as it is almost sure to shatter some post a little, thereby weakening it. Of course it would pay sometimes to put a charge in a log to open it. Should it be a very tough one it saves time. To make a good substantial fence, say 3ft. 10in. high, the posts need to be 1ft. 10in. to 2ft. in the ground, therefore the posts should be 5ft. 10in. to 6ft. in length. Split posts 7in. x 3in., free of sap, will last a lifetime under ordinary circumstances. In sawing off logs, be a splitter ever so careful, the saw will sometimes run a little out of true, leaving a long and short side to the log; or there may be a bend in the log. If this occurs the short posts and long ones should be placed in separate heaps, then when they are carted on to the line those which are a trifle long should be placed in a hollow, and those a trifle short should be placed in stony patches or on any sudden rises in the ground. If this is duly noted much hard sinking is often saved. If possible split all posts some time before they are required. This gives time for the sap to run out; also green posts rust the wires. Strainers should be cut from dry curly limbs if possible, not less than 1ft. in diameter at the small end. Corner strainers should be 7ft. 6in. long, and line strainers 7ft. These can often be cut from limbs of the trees fallen for splitting posts. Also a long post or two required for supports in crossing a creek may be cut from same. Having fully prepared the posts for the fence, clear the line of all overhanging timber, as this will save a good deal of trouble later on. Also clear all undergrowth as prevention against fire. The line can then be pegged roughly as a guide in carting the posts, which should be dropped at equal distances, not more than five in one heap, allowing about 45ft. between the heaps. This leaves about 8ft. between the posts. Do not cart strainers until you have made a good start at the fence, as it sometimes happens that by going a panel or two farther, or dropping one, it will save some hard sinking. Put up the posts as you sink the holes, as this prevents rubbish from accumulating in the holes. If the fence is being erected over an old line avoid putting the posts in the old holes without cleaning them out thoroughly, as white ants have probably collected in the old butts, and they very quickly will spoil the good posts. Cut a stick 8ft. long for measuring, and take your measure from end to end. In sinking the holes allow plenty of space for the rammer; be careful that no leaves or rubbish get in with the earth. See that all posts are well rammed, especially strainers. Avoid making strains shorter than absolutely necessary. On even grades eight chains is close enough for strainers. See that the fence runs in as even a grade as possible. This can be done by raising it a trifle in sudden dips in the ground, and by dropping a trifle on short bumps. Keep posts as near to the upright as possible when putting up, for they will get out of the perpendicular quickly enough. When posts have been erected bore them with a ⅝in. bit for plain wire and 1½in. for barbed wire. Mark the posts from the top. This is a good gauge for both sheep and cattle—Barb 2in. from top of post, 1st plain wire 10in., 2nd plain 9in., 3rd plain 8in., 4th plain 7in., 5th 6in,, and bottom wire 6in. from ground. To make an extra strong fence raise the barb on top. The remaining five should be No. 6 gauge. To run barb wire place the coil on an ordinary spinning jinny (without the pegs), being careful not to undo an end beforehand. Now open the end of the wire and splice 5ft. of plain wire for convenience in handling. Strain the barb wire before putting in the other wires. It is always better to strain the top wire one strain ahead of the others, as this will save strutting line-strainers. Do not use more over-ground struts than necessary. Where over-ground struts are used care should be taken to have struts a good length, as short ones tend to lift posts. The best place for the strut is under the second wire at strainer, reaching back to the bottom of the next post, which would mean about 9ft. Strain all wires tightly, but it is possible to over-strain, especially barb wire, which begins to turn around when over strained. As soon as this is noticed stop. After plugging wire pull the straining jack off quickly, and bring the loose end of wire smartly round the post. Do not use the hammer in bringing the wire round. The approximate cost of a fence of this kind at the present time would be £65 per mile. For division lines a much lighter fence than that described would suffice. I prefer wooden posts 24ft. apart, with two droppers between, thus leaving 8ft. between supports. Use barb wire 2in. from top, four plain wires (No. 8 ordinary or No. 12); height of fence 3ft. 6in. The following is a good gauge for this fence:—Barb 2in. from top, 2nd 11in., 3rd 10in., 4th 8in., 5th 7in., and bottom wire 6in. from ground. If lamb-breeding is carried on use wire netting, or something similar, between grazing land and cultivation plots. When the wire becomes slack, undo it at the straining posts. Cut off the piece of wire that was fastened round the post. Fasten the straining jack on, pulling the wire up tightly. With care no extra wire need be used. It is always a good plan to strain wires in new fences at the end of the first summer after erection, as it will help to lengthen the life of the fence. If a wire is broken, always undo it at the strainer and pull it up by means of the jack. It does not pay to twist a wire up with sticks. If posts are broken off it pays best to undo the wire at the strainer, put in a new post and bore and run the wires through. On no account staple wires on to posts, as this interferes with straining later on, and gives a fence a patched appearance. In bringing this paper before you I have confined my remarks to the hills and settled districts, knowing full well that fences such as described would not pay to erect on large wheat areas or on pastoral lands ''out back,'' where ''make-haste'' fences serve the purpose equally well, and can be erected for about half the cost.

### NARRUNG (Average annual rainfall, 17in. to 18in.).

April 28th.—Present: 21 members and one visitor.

Bookkeeping on the Farm.—Mr. W. T. Lawrie submitted a paper on this subject, in the course of which he said:—It should hardly be necessary to emphasize the fact that for the successful pursuit of any business bookkeeping is imperative. The farmer's business is a somewhat complicated one, embracing as it does several differing lines. There are some who jog along somehow, with only the heel of a cheque book and the pass book to show their financial position. We read of farmers becoming bankrupt, and any person who reads the evidence taken in the Insolvency Court knows that in nearly every case the insolvent does not keep proper books, and it is an exceedingly rare occurrence to find a farmer who has been in the habit of recording all his financial transactions among the bankrupts. There must be some connection between the two, for when bad seasons, bad health, or bad luck comes along it seems to be the methodical bookkeeping farmer who is still able to weather the storm, while disaster comes to the other. A farmer should keep strict accounts, not only for his own information, but for the sake of his family. He takes a variety of risks in his vocation, and should sickness, disablement, or death remove him from the supervision of the business his books should show his family or executors just how things stand. It would also be of great advantage to have the elder children (if any) to assist in recording accounts. For instance, it might be arranged that one should keep the dairy book, another the poultry, and so on. These separate accounts for separate branches being kept under the farmer's supervision he would then only need to summarise and enter the results in the general book. Then in case of his sickness, instead of things getting behind, and giving him no end of worry later, he would find no difficulty in getting going again. He will find it advantageous and very instructive to have an account kept for each of his operations, then he would soon discover whether it was worth his while to continue some of them. If he set aside a definite time each day or evening to be allotted to making the entries, it should not take more than a quarter of an hour. Do not put off making an entry. A couple of minutes at the right time will save half a day of brain searching later on. During the course of his paper he demonstrated the method of using a simplified form of bookkeeping, and in closing suggested (1) The making of the balance each quarter. This will lighten the task at the annual balance. (2) Give the wife and children a share in the work. (3) Get the wife to keep a book showing everything withdrawn from the farm for domestic use. (4) Do not neglect to enter every little expense incurred on behalf of the farm. Mr. Hackett agreed with the writer of the paper and the necessity for systematic bookkeeping. From experience he could speak of the benefits to be derived from such a course. He then described the correct method of treating stock as a separate profit and loss account. Mr. Lawson expressed appreciation of the paper, and upheld statements *re* necessity and value of well-kept books of account. He referred to records of Insolvency Court and difficulties experienced by those who could produce no proper records.—Mr. Goode then dealt in an able manner with the preparation of income tax returns. By means of enlarged copies of the return form he showed how each section should be dealt with, and explained away many of the difficulties which confused the farmer in his preparation of the return. He explained the words ''standard value,'' and gave the standard values as follows:—Pigs, £2; sheep, 10s.; cattle, £5; horses, £7. The values were to remain fixed for the purpose of the return. In concluding Mr. Goode mentioned some of the difficulties and errors that had come under his notice, and promised help to any who were in doubt. At the end of his interesting and instructive effort a few questions were asked. The clearness with which the subject was handled left little need for further explanation.

## PORT ELLIOT (Average annual rainfall, 20.33in.).

April 21st.—Present: nine members.

Subdivision of a Small Farm.—In the southern districts, remarked Mr. Jas. McLeod, in a paper on the subdivision of small farms, the average holding varied from 100 to 500 acres. Very few had the latter area, the average being about 200 acres, so he would deal with that sized farm. Areas being limited, the landholders were not what were generally termed wheat farmers, but practised mixed production—a little of everything—such as dairying, pig-raising, sheep, poultry, fruit and vegetable growing, &c. In regard to dairying, on a 200-acre farm, it was rather difficult to gauge the carrying capacity of the south lands. Some, near the sea coast, would carry nearly double the stock the hills would, and therefore it was necessary to strike an average. About 15 cows, one bull, rear four calves, four horses, 50 pigs, and 50 hens would be the stock which should be put upon 200 acres. Should the land be fairly level he would subdivide 160 acres into 10-acre paddocks (of course that would have to be done gradually). At first he would cut the 80-acre blocks into two, then divide again, and so on until the 10-acre block was reached. The remaining 40 acres would be the homestead, with the necessary surroundings, yards, stables, &c. Should the land and position be favorable, he would plant five acres of orchard. At the back, and not too far away, he would make four one-acre pig paddocks. Experience taught him that they would do much better in small paddocks than in sties. If the land were poor and sandy they would soon enrich it. He had seen poor sand, so treated, produce splendid pastures. The cows should be Jerseys, or Jersey cross, mated to pure Jersey bulls, because the farmers were not milk suppliers, but cream and butter producers. He would have two draught mares and two stout buggy horses, strong enough to take the side of a plough, binder, or drill. He would breed a foal every year by the best draught stallion to be procured, using each mare every alternate year. A good draught yearling would always bring a payable price, providing it was of the right stamp, and well kept. He preferred the short-legged, big-bodied compact horses, because they were much easier to keep in condition, and always looked better than the long-legged animal, and brought a better price in the market. To get the 50 pigs mentioned, he would keep four sows and one hog of Berkshire breed. Two litters every year from each sow would easily give the 50 pigs. On those small farms they could not afford to fallow, land being too dear, therefore they must make use of every acre; consequently he would recommend growing peas instead of fallow, and would put in 10 acres in May and 10 acres in July, also 20 acres of hay, 10 acres of wheat, and 10 of oats. That acreage, in an average season, would give ample fodder and grain for the before-mentioned stock. Those crops should be grown in rotation, and all grain and hay be consumed on the farm and converted into cream, pork, and eggs. Should the land be hilly he would recommend a few small paddocks in the gullies sown down to lucerne. It would grow a lot of feed in the summer, without irrigation, if the land were at all damp; and by having small paddocks the stock could be changed from one to the other, and it would carry more than double the stock, used in that way. After some slight discussion Mr. McLeod, in reply to a question, said that he would cultivate 60 acres every year.

CHERRY GARDENS, May 1st.—The meeting was held at the homestead of Mr. C. Ricks, and general pleasure was expressed at the appearance of the place, the orange, vegetable, and fruit gardens being inspected.

Pests.—Members reported the appearance of mice, which were doing damage to haystacks, vegetables, &c. Slugs were also making their appearance. Messrs. Ricks and Chapman both reported the appearance of woolly aphis, which appeared to develop most rapidly where the limbs had been removed in pruning, and in rough places on the bark on some trees; more particularly Dunn's Seedling.

FOREST RANGE, May 10th.—An address on the question of cold storage of fruit was delivered by Mr. G. A. Dunn, who outlined the system of co-operation as practised in Victoria, and gave an interesting account of a recent visit to the fruitgrowing districts of Tasmania.

HARTLEY, March 7th.—Mr. F. Clark read a paper on the selection and treatment of seed wheat, in which he advocated careful grading and cleaning. If that were not effective in removing all barley the farmer could, when the crop came up, pull out all the barley. Though that seemed a laborious and expensive process, after one or two seasons he would be rewarded by having clean seed. He advised pickling the seed every year in a solution of ¾lb. of bluestone to 10galls. of water. The solution should be placed in a cask and the seed tied in a bran bag and immersed in the solution until it was well soaked. A discussion ensued, and members generally endorsed the views set out in the paper.

MILANG, April 14th.—Seeding Operations.—This subject was dealt with in a paper by Mr. William Perry. A noticeable feature in the discussion was that farmers on rich alluvial soil and those on poor sandy scrub country maintained that the best results were secured by sowing 40lbs. of wheat per acre. Farmers on good agricultural land recommended sowing a bushel, and sometimes more per acre.

MILANG.—In the presence of 35 members and 15 visitors the Principal of the Roseworthy Agricultural College (Mr. W. J. Colebatch, B.Sc. (Agric.), M.R.C.V.S.), delivered an address dealing with the rearing of early lambs for market, and the feeding of sheep.

PORT ELLIOT, May 19th.—Consideration was given to the question of keeping more livestock on the farm. Mr. Green mentioned horse bean as a good fodder, which should be sown about August in that district. Mr. Hargreaves reported having sown that crop in August, after having dug early potatoes. The result was a crop equal to 40bush. per acre. He recommended philaris commutata as one of the best grasses to be grown in many parts of the district.

STRATHALBYN, May 8th.—A general discussion took place on the ravages of mice, and the trouble occasioned through foxes and rabbits, and a paper from the *Journal of Agriculture* on "The Sanitation of the Farm" was read.

## SOUTH-EAST DISTRICT.

### GLENCOE (Average annual rainfall, 33.84in.).

February 26th.—Present: 15 members and two visitors.

Barley.—In that district it had been usual to grow barley after potatoes, said Mr. F. A. Telfer, in a short paper, but as potatoes were not now grown to the extent that they formerly were, land that had the previous year carried that crop was not always available. It then became necessary to fallow the land in the summer, and keep it well clear of sorrel and other weeds. It was not a good plan for one barley crop to succeed another, but if an oat crop were grown between, the second barley crop would return good results, but it was best to fallow the land after harvest. Have the ground ready, get good clean seed, and pickle, using 1lb. bluestone to about 8bush., and drill in no more than 1bush. of seed to the acre, about the end of July or the beginning of August. It is not necessary to use manure on the heavy land after potatoes, but would advise putting a little manure on other land, say about 50lbs. to the acre. If we have a lot of wet after the barley is sown, and the land gets caked, I would harrow to loosen the surface; if dry, I believe in rolling the crop. If the farmer wants the straw, which is a valuable standby for cattle in the winter for feed, he will have to cut the barley with the binder, and stack and thrash it, otherwise he will use the harvester or reaper-thrasher. With the scarcity of labor, as at present, the farmer saves a lot of work by using the harvester or reaper-thrasher, as he can take off his crop without assistance." Mr. M. D. Cameron used ½lb. bluestone to the bag of barley, steeping in a cask, and had found it effective against smut. Mr. T. Gratwick had sown barley on grass land, using 100lbs. of basic slag per acre, and had a yield of 41bush. per acre. For pickling he used 1lb. bluestone to 8bush. of seed. Mr. H. A. Cameron considered that pickling on a floor was both quicker and more effective than steeping. He used 1lb. bluestone to 4galls. of water, and that was sufficient solution for 8bush. of seed. Mr. J. Dow favored a heavier seeding per acre. He did not think 2bush. was too much. Mr. J. Fraser said the grubs would take all his crop if he sowed 2bush. per acre, and it was the opinion of members that as a general rule, the thicker the sowing the worse would be the ravages of grubs.

Sowing Grasses.—Mr. H. A. Cameron read a paper on "Sowing Grass Seeds," with especial reference to rye grass. He favored local seed if obtainable, and would use not less than 1½bush. per acre, and thought that possibly up to 4bush. per acre might be used with profit. He would plough the land, but only to a depth of 2in. or 3in., and broadcast the seed after drilling about ½bush. of oats or barley as a cover crop, and either cover the seed with a light harrowing, or, what he considered a better method, by travelling a mob of sheep over the ground in close order. He said rye grass should not be allowed to seed during its first season, but should either be cut for hay or fed off rather heavily, and personally he preferred feeding off. Mr. R. Agnew asked whether rye grass would do well if sown on stubble land. Mr. Cameron replied that he had known that method to be used with good results. Mr. M. D. Cameron thought that it was a mistake to sow barley with rye grass, as barley was a land robber. More attention should be paid to sowing grass seeds, as was proved by the great carrying capacity of pastures in older countries by the laying down of grasses, and considered that every farmer should at least have a plot of lucerne. Mr. T. Gratwick said that Professor Perkins advocated the use of a light roller for covering grass and other small seed. He believed that Mr. D. Collings, Secretary of the Mount Gambier Bureau, had tried covering the seed with sheep, and pronounced it a failure. The Secretary thought that it would be advisable to sow a mixture of grasses instead of all rye grass. According to reports the Agricultural Department of Ireland had proved that the pasture of mixed grasses was far superior, and more profitable than one variety of grass.

## KONGORONG.

May 1st.—Present: 10 members and four visitors.

Farming in the South-East.—The following paper was contributed by Mr. G. A. G. Bannister:—"No matter whether one goes in for cereal crops or for grazing, the land in the first place must be well cultivated, as even the natural grasses grow better on cultivated land than they do on virgin soil. It is advisable to find out which seed is most suitable for this particular class of country. Among many of the settlers wheat does not seem to be held in very great favor. This particular cereal is a great asset to the northern part of the State; why should it not do well in the South-East? Wheat is grown in England, New Zealand, and Canada. All of these countries have a very cold climate, and have a greater rainfall than we have in these parts. I am of the opinion that cropping is unsuccessful without the use of fertilisers. The South-Easterners seem to go in mostly for oats, and at the present ruling rates 12bush. of wheat are equal to 30bush. of oats per acre, and also mean less labor, bags, and cartage. In regard to the harvesting of the crops, has the harvester, or the reaper-thrasher been given a fair trial? It seems to me to be a lot of unnecessary labor to cut and bind a crop, stack it, and then thrash it, when the harvester will accomplish the work in one operation. The growing of summer green feed, such as lucerne, maize, &c., for stock, is a very important item. These crops can be grown on the irrigation system, as there is practically an unlimited supply of water to be had in these parts. With a petrol engine, say 5-horsepower, and a centrifugal pump, one could pump 3,000galls. per hour at a cost of 1s. 1d. per hour. By growing lucerne in this manner one should secure at least four cuts 18in. long a year. I prefer cutting to feeding off, as the stock damage more than they eat. Lucerne during the winter months requires a dressing of stable manure. Green feed during the summer months is very beneficial to milking cows A good dairy herd takes time and patience to get together. A large area of South Australia is wonderfully adapted for successful dairying, and the industry is making great progress throughout the State. Landholders are recognising that it is a profitable branch of agriculture, and some are devoting their attention to it exclusively, rather than as a mere adjunct to cereal growing. An important aid to the rapid development in dairying is the wealth of natural grasses which grows in many districts. The natural grasses maintain the stock in excellent condition throughout the greater part of the year, and enable them to yield milk of a very high standard. The mildness of the climate permits the dairyman to leave his stock in the open right through the year, consequently the shelter sheds need not be extensive, thus saving expense. He is also enabled to dispense in a large degree with artificial feeding. For dairying purposes the Shorthorns are much in favor. In discussing the subject, Mr. C. T. Atkin mentioned that that district could produce wheat, but a question yet to be determined was the most suitable variety to grow. An interesting debate took place in regard to the relative merits of different methods of harvesting, and Mr. C. T. Atkin mentioned that lucerne would do well in some parts of the district without irrigation.

Mr. D. Uphill mentioned millet as one of the best summer fodders to be grown for cows. Mr. W. Aslin stated that by ploughing up the land and sowing it with speargrass, he had greatly increased its stock-carrying capacity.

## KYBYBOLITE (Average annual rainfall, 22in.).

May 3rd.—Present: 15 members and one visitor.

FORAGE CROPS.—The following paper on this subject was contributed by Mr. S. H. Shinckel. "With the scarcity of stock, chiefly sheep and cattle, it certainly behoves the farmer to produce as much feed as possible to keep them in a good, flourishing condition all the year round. This assures a better percentage in the increase of young stock, a better milk supply, more feed is provided for pigs, all slaughtered stock return greater weights, consequently there is a reduction in the number killed for the farmers' requirements, and if sold to be slaughtered, the returns are higher. This does not only benefit the farmer; it will benefit the community and the British Empire. A few acres of forage crops grown every year should not reduce our wheat returns; in fact they should ultimately increase the production of wheat from a smaller area sown. When we read of the scarcity of meat in England, does it not suggest to us that if we are truly patriotic we should grow much more in the way of forage crops in the immediate future than we have done in the past, and knowing that we are favored with a good rainfall, I feel confident that much more can be done in this direction. Believing this to be true, it then behoves us to learn all we can of the use of such crops. For our district we may class forage crops under seven headings, viz., cereals, white mustard, cabbage family, leguminous plants, root crops, melons, and the sorghum family, and I will deal with them in that order. Of cereals for early green feed we have a fairly large variety from which to choose. The following will, I think, be found suitable to our soils and climatic conditions:—For wheat—King's Early, Steinwedel, and Nhill. They are quick growers, and produce a lot of flag. Then we have Algerian and Cape oats, Cape barley and rye—all good for early green feed. If the best results are to be obtained from cereals as green feed they should be sown on well-prepared fallow, failing that they should follow a leguminous crop. Fallow land has a great advantage, inasmuch as it can be sown much earlier, or in other words, grain sown therein will germinate with less rain, owing to the amount of moisture which can be conserved. As all cereals, when grown for green feed are sown early, it is very necessary that they should be sown to a fair depth so that the seed may be in contact with the moisture. For early green feed heavy manuring and thick sowing are necessary as well as good cultivation. A rich, loamy soil generally gives best results, as it retains the moisture very much better than our heavy black soils. The same remarks apply to Algerian oats and Cape oats, rye, and Cape barley, which grow fairly well on our poor, sandy soils, provided it has a liberal application of manure, rye being preferable for that class of land. White mustard for early winter feed must be sown early. It grows well on our heavy, black soils, and also on our poorer classes of soil if well supplied with manure. It is best to sow from 6lbs. to 8lbs. of seed per acre very shallow. Mustard grows very quickly, and makes very good feed for ewes and lambs. It certainly is not best for milking cows, as it has a tendency to taint the milk; it is only good for winter feed. It may be fed off or cut, but always before it goes to seed. In good seasons it may be fed off two or three times. *Cabbage Family.*—Here again we have a wide selection—kale, rape, chou moullier, Chinese cabbage, and others. These plants, like nearly all their kind, are gross feeders, and need heavy manuring. Kale may be sown with a drill in the field or in a small bed like cabbages, and transplanted. If it is intended to be transplanted the seed should be sown in a small bed, about April or May; the plants will then be ready to be put out in July or August. When planting use an old piece of fencing wire, tie pieces of binder twine every 4ft., fasten a stick 4ft. long each end of the wire, fasten the wire to the fence of the field with the stick, pull the wire tight, and peg at the other end. Make a hole with a dibber at each tie of the twine, and put in the plants. When the first line is completed shift the wire the same distance as the length of the stick, and continue doing this until completed, and all the plants will be in rows convenient for cultivating four ways with a Planet Junior cultivator. Cultivating will be found very beneficial for keeping down weeds and conserving moisture for the summer months, but do not cultivate too deeply. At 4ft. apart it takes 2,732 plants to cover one acre, and ¼lb. seed carefully sown, should easily supply that number. Chou moullier may be treated in the same way. If sowing kale directly in the field, mix the seed with super at the rate of about 1½lbs. or 2lbs. per acre. The land should be worked down pretty fine, and the seed must not be sown deeply. Rape, chou moullier, and Chinese cabbage may be sown in the same way. For rape, use 2lbs. to 2½lbs. per acre, chou moullier 1½lbs., and Chinese cabbage, 4lbs. to 5lbs. Never mix small seeds with super. until you are ready to sow them. For directly sowing in the field, we have two seasons of the year, viz., autumn and early spring, say August. They may be sown by themselves or in a cereal crop if it is not too far advanced, and then rolled. In this way the sowing can be done by hand or with a small seed sower. Kale and chou moullier sown in August are not very likely to go to seed the first year, and they will do very little damage, if any, to cereal crops. Do not sow Chinese cabbage or rape with the crop, as it always goes to seed the first year. I have sown chou moullier with wheat and oats in May and June, and never regretted doing so, finding it provides a good lot of green feed for stock during the summer and following winter. If sowing with a cereal crop only use about one-third the amount of seed quoted above. When feeding off any of the cabbage family it is always wise to take the sheep off when the plants are fairly stripped, particularly in the summer months. If constantly fed the plants are likely to die. Should aphis attack these crops at any time feed off immediately. Where kale or chou moullier has been transplanted it is much better to strip the leaves as required, and feed to stock. *Leguminous Plants.*—I cannot claim that I have had much experience with the clover family, so will confine my remarks to peas and vetches. These will grow on almost any soil, provided it has a good drainage. For peas sow about 2bush. per acre about the end of June or in July. I cannot say I have found vetches to be a success by themselves, but they are very useful if sown as a mixture in an early green feed crop. Use one part of vetches to three parts of other seed. *Root Crops.*—We can safely confine these to mangolds, sugar beet, and turnips. Mangolds do best in a good loamy soil. They also do well on our heavy black soil provided it is not too clayey. The land must be heavily manured with stable manure, 40 dray loads is not too much per acre. This should be carted out in the autumn before the land becomes too wet, as the constant carting of manure when the land is wet causes it to become sodden. This is very detrimental to a mangold crop. Carting out the manure in autumn also saves labor in weed destruction. Plough the land deeply when the manure is spread and harrow down to a fine tilth to encourage weeds to germinate. As weeds appear kill with a cultivator, or preferably the plough. The more often the land is ploughed the more weeds will be destroyed, and the land will be brought into a good state of fertility. As soon as the mangolds are well through a good eye should be kept on the weeds. Use the Planet Junior freely, but not too deeply. Give the young plants a dressing of salt, from 2cwts. to 5cwts. per acre. Salt is a good dressing for mangolds; it will help to check some of the weeds, while it also destroys slugs, &c. Kainit or sulphate of potash are both very useful manures for this crop. If kainit is used the salt may be omitted. When plants are from 3in. to 4in. high, thin them out to about 1ft. apart. When the mangolds have a fair amount of foliage the outer leaves may be stripped, but on no account should the centre ones be interfered with. Mangolds take a long time to mature, and are not at their greatest value until about June, July, and later. They then contain the greatest amount of sugar. When matured they can be pulled out and carefully stored and fed to stock for July, August, and September. With good cultivation and manuring 50 tons per acre can be grown in this district. We have different varieties—the long reds and the globe. The former require a deeper soil than the latter. The yellow globe variety contains more sugar than the long reds, but, as a rule, is not such a heavy cropper, with the exception of Carter's Winsor (yellow globe), which has always given larger returns with me than the long reds. Sowing should be done about the end of August or early in September. The seed can be sown with the ordinary seed drill. A 13-hoe drill suits very well. Take the pins out of the stars or cone of manure feed Nos. 2, 3, 4, 6, 7, 8, 10, 11, and 12. This will leave only Nos. 1, 5, 9, and 13 casting manure, the drills being 2ft. 4in. apart. Now set the drill as though to cast 1cwt. of super. per acre, mix 3lbs. or 4lbs. of mangold seed with about 30lbs. of super., put this in the drill, and sow about 1in. deep. This should sow about one acre. An assistant is required for sowing mangolds in this way. The assistant keeps the lid of the manure box open and constantly stirs the mixed super. and seed with his hand. This prevents the light seed working to the top of the super., and ensures an even distribution. *Sugar beet* requires the same treatment as mangolds, but needs less salt, the plant being smaller than mangolds, the rows can be closer, and a little more seed used. Sugar beet has a much higher feeding value than any mangold, and is deserving of much more attention than it receives. Like the mangold, it involves a great deal of labor, and therefore is not valued by the tired man. Field turnips may be sown during two seasons of the year, viz., autumn and August. They do best on a light loamy soil, and also do well on our heavy black soils, which contain a good supply of humus. Some of our good swamps, when dry, should grow them to perfection. The land must be worked down to a fine tilth. The seed should be sown with the drill, as directed for mangolds, the rows being 14in. or 21in. apart. Use from 3lbs. to 4lbs. of seed per acre, and sow very shallow. No assistant is required for sowing turnips. After cultivation similar to that advised for mangolds turnips can be grazed by sheep, or they can be pulled when matured, stored, and fed to stock as required; they will sometimes keep a good while under cover. Turnips do not require such heavy dressings of manure as mangolds. Scotch purple top have given best returns with me. We have a great deal of light sandy country in this district, which, with very little cultivating or manuring will grow the larger varieties of pie melons. All that is necessary is to plough the land in August, cultivate or harrow about the end of September, walk over the land with the seed, put four or five seeds in a circle, and put the foot on them. Do this about every 5yds., protect the plants from rabbits, and leave Nature to do the rest until they are matured. Sheep eat them very readily when once they get used to them. They can be carted to an open shed, laid on a little straw, and will keep for a long while if carefully stored. Maize, sorghum, and millet do best on a good loam with a good subsoil. They will also do well on our rich black soils in good moist summers. The land should be ploughed early and deep, be well cultivated and harrowed to conserve moisture, they being entirely summer crops. For manure use 1cwt. of super. and 1cwt. of bonedust per acre. A portion of this should be applied before the seed is sown. Sowing should be done about the end of September or October, according to the season. For maize I prefer Horse Tooth and Hickory King. It is best sown in drills 3ft. apart, so that the Planet Junior cultivator can be used. If sown 3ft. apart 20lbs. of seed will be sufficient for an acre. If broadcasted more seed is required. *Sorghum.*—I prefer Amber Cane and Saccharatum. If sown in drills 2ft. apart use 4lbs. or 5lbs. per acre, if broadcasted 6lbs. or 8lbs. seed might be soaked for 48 hours in cold water before sowing. Of the millets I prefer Pearl and Japanese. The former I have found to give much more feed per acre, but all stock prefer the latter. If sown in drills 2ft. apart use 4lbs. per acre, more if sown broadcast. The sowing of maize, sorghum, and millets can be done with the ordinary drill, similar to mangolds. Just a few words on the value of forage crops for farm animals. I think we all know, or should know, how they appreciate early green feed such as wheat, oats, &c. It is very useful, in fact indispensable, to the milking cows, young foals, ewes, and lambs, in fact every animal on the farm. Mustard is somewhat different. It is not the best for milking cows, but is very useful for ewes and lambs. Kale, chou moullier, &c., if sown in autumn provide good early winter feed, and if sown in August provide good feed for early summer. They are useful for all stock on the farm. Peas can be fed in the field when ripe, to sheep and pigs. They can be fed in the haulms, or may be thrashed and cleaned, and fed as grain. They are very fattening for sheep, lambs, pigs, and horses. Vetches are best sown mixed with early green feed, and can in that way be fed off by stock, or they can be cut for green feed, as required; and in spring, when feed is plentiful, I understand it is a good mixture for ensilage. Mangolds and sugar beet are very much relished by milking cows, and make a very good ration in the winter months if sliced and mixed with good straw chaff; they also make very good feed for pigs and poultry. Turnips can be grazed by sheep, or be fed to sheep and cows similarly to mangolds. Melons may be fed to sheep, cows, or pigs as soon as they have reached maturity. For sheep they can be fed in the field. Once or twice a week walk through the melons with a hammer, give a few of them a hit, just to knock a piece out, and the sheep will do the rest. For cows, they make good autumn and winter feed sliced and mixed with chaff. They are also useful for pigs, but not fattening. Pie melons will keep for months if carefully stored. Maize can be cut for cows as soon as it has made sufficient growth. Sorghum and millets are best left until the seed commences to form. Sorghum in particular is always liable to cause a poisonous gas in cows if fed before it goes to seed. These crops, can, I believe, be conserved for good winter feed by putting down alternate layers of straw, maize, sorghum, or millet, and I understand this makes a good stand-by for lean years. I have just briefly tried to explain the value of forage crops to stock, and how to use them. *Soil Improvement.*—Let us now see how they affect the soil. In the case of early green feed, such as wheat, oats, &c., if simply cut and fed to stock I certainly fail to see that it improves the soil, but if it is grazed and ploughed in at the end of winter or early spring it certainly improves it, there being an increase of humus, while the excreta of stock, both liquid and solid, will be conserved. If vetches have been included in the green feed, then a fair amount of nitrogen will be conserved for the following crop. Mustard has no special value as a soil renovater in itself, excepting by providing humus; but if fed to ewes and lambs the mustard is converted into manure, both liquid and solid, and left directly on the field When mustard is fed off for the last time it should be fed very close, and then ploughed. If the land is suitable it will be in good heart for a potato crop. As kale, &c., usually lasts for several years, and carries a lot of stock for that period, the land will generally be found in fair order for a cereal crop. Peas, on account of gathering a quantity of nitrogen and storing it in the soil, leave it in good condition for early green feed, hay crops, and others. Mangolds, &c., require heavy manuring, and are deep-rooted, hence they certainly pave the way for any of the cabbage family. I very much doubt if piemelons have any beneficial effects upon the soil. In dry districts maize, &c., can have no beneficial effects upon the soil, but in our own district, which generally has a heavy rainfall, it has been found in a number of instances, that wheat following maize gave better returns than has fallow. The reasons for this I cannot explain, excepting where maize, &c., has been heavily manured.

## MOUNT GAMBIER (Average annual rainfall, 32in.).

April 14th.—Present: 19 members.

**Best Breed of Sheep for the District.**—What was the best breed of sheep was a question frequently asked, remarked Mr. E. F. Crouch in a paper in which he discussed the best breed of sheep for the district, and the answer was that breed which suited one's own particular land. As showing how necessary that was, they should look up the different breeds of sheep grown in the British Isles alone, and they would find that each county had a breed that had been bred to suit local requirements by skilled breeders, if they might judge by the samples that had been imported. They could first take the Lincoln, which was a grand sheep in every way; a picture to look at, and a bale filler, and which carried wool to a good age, and in addition made an ideal cross when mated with the Merino, either using Lincoln rams on Merino ewes, or Merino rams on Lincoln ewes. The cross of the first-mentioned was a good class of wool, always commanded a good price, and was of good length, character, and density; but he had found the latter cross of longer staple, dense, and a good quality, and, if anything, larger and more the shape of the dam. He had always been much impressed with the excellent features of this cross, but the point was if they did not suit one's pastures they were no good to him. Another British breed known to them was the English Leicester, a good class of sheep for fattening, but not the heavy cutter that the Lincoln was, but for crossing with small ewes they were very suitable, as the rams were smaller in the head, which was desirable. Then there was the Border Leicester. In some late experiments at the Government farms in New South Wales, they had been found to produce in the competitions the most profitable fat lambs, and had the reputation of being hardy, but they never impressed him as wool-cutters after they were two years old. The Romney Marsh had come into great favor during the last few years, and there were numerous stud flocks in New South Wales and Victoria, and three in South Australia. Those breeders who had used that class of sheep were very well satisfied with them, as being of good constitution, and consequently good doers. On one occasion he saw a lot of half-breds shorn. About half were by Romney rams and the other half by Lincoln rams from Merino ewes. They ran together, after being weaned, and were drafted at shearing time, and the Lincoln cross beat the Romney by 9oz. average per head, but when the account sales of wool were received, the Romney cross beat the others for most valuable fleece per head. There were more Romney studs in New Zealand than all the other long-woolled breeds put together, and as New Zealand was the great exporter of lamb and mutton the Romney evidently suited the trade. The Dorset Horn impressed his appearance on his progeny, and the lambs seen at the show were always among the best, and as they matured early and ran into good weights, as a fat lamb proposition they were all right. The neat-looking Shropshire was a good fat lamb producer, and unless one intended fattening off the lambs, the rejects were not equal to other breeds as wool producers, but for carcass sheep they were among the best. The Hampshire Downs were represented in New South Wales and Victoria, and were good fat lamb producers. On one occasion in New Zealand he put 500 three-quarter bred Lincoln ewes to Hampshire Downs rams, and marked 115 per cent., after losing a few ewes in a creek, and a few otherwise; but when the oldest lamb was 3½ months old he sent away 340 lambs, and a fortnight later 160, and the lot averaged 37½lbs. freezing weight. The following year he put 1,200 similar ewes to Hampshire Downs rams, and secured space in freezing works for 1,000 lambs. As he could not get into the works until the oldest lambs were 4½ months old he had a great number rejected as lambs, and they were put into the mutton class. One of the lambs dressed 73lbs. The skins from those sold well, but those he kept for another year did wonderfully well as fat sheep, numbers going over 100lbs., but the yield of wool was disappointing. Southdowns, Cheviots, Oxford Downs, and Cotswolds were, so far as he knew, not represented in the South-East. Last, but not the least in importance, was the Merino, of which breed the greater number of sheep in the Commonwealth consisted. There were a good many types, all bred to suit different localities, and each had its admirers; but there was one thing—the weedy Merino had now no friends. Because in the first place they were not good fatteners, as the production of yolk was too great a strain on their constitution, and unless in warm and really good country it was difficult to top them up, and the blowfly pest was worst in the yolky sheep. The Merinos were truly wonderful sheep, because they thrived on the snowy mountains as well as on the hot plains of Central Australia, and they travelled miles to and from water when in their paddocks, which no other breed would do. It was the sheep for the greatest part of Australasia. All the above breeds were monuments of thought and skill, and the country was under a great obligation to the breeders of the different classes, for though one paid three guineas or more for a two-tooth ram it did not pay the breeder so well as raising a fat lamb, for the reason that studs were expensive to establish and keep up, and to be a successful breeder one had to keep his sheep at their best, and give a lot of skilful attention, which every sheep breeder did not possess. Again, some studs were started in country that did not suit, hence their failure. On the richer lands, the heavier breeds were most suitable, but to keep heavy-carrying land in healthy condition it was necessary to plough and provide clean and sweet feed, and a change. In a season such as that just passed the sheep generally did not do well, or were less healthy, and sheep just now were too valuable to run any risks with. He had given intra-tracheal injections to lambs suffering from lung worm with the greatest success, and the mixture was turpentine, carbolic acid, and opium. He also tried chloroform instead of the opium, but thought the former was the more soothing, and the lambs stood the treatment better. Everyone had his own cure for intestinal worms, but he found Little's fluid dip—one part dip to 25 parts of water, and the dose 4oz.—a good one. Lambs and sheep that had sore mouths could be cured in a few days by washing the mouth with a preparation of the same strength. He put the fluid in a bottle with small angle cuts in the cork, and put the sheep in a race. He then took the sheep between his knees, lifted up its head, poured the dip mixture on, and gave it a rub, and in a week's time there would be no sore mouths. Those that were bad would be cured, and the others would have the parasite destroyed. They had, of course, noticed among sheep that some did better than others, and also carried a good fleece. If they had a mixed flock they should by all means get as close as they could to that for this particular class, as they suited one's country. The best thing to test one's wool returns was to see how much money per acre the sheep cut. It was well known that the long-woolled sheep could not be kept on poor country, because the food raised on it was not sustaining enough for big sheep, but some of the crosses in which the Merino had greatest share were the most suitable if one had to keep

Comebacks of Crossbreds. He would strongly urge all sheep owners to keep their flocks as even as possible. Then, when they had sheep or wool to sell, they had a line which always attracted buyers; but if their sheep were Comebacks, Crossbreds, long wools, and black faces, they would probably meet with a buyer, but the competition would be among a few; whereas if one had an even lot, every buyer would compete. So with the wool; too many star lots would benefit, not the producer, but the buyer, who would obtain the wool more cheaply on account of the mixture, or that it was in too small lots to attract every buyer. During the last 25 years a number of station owners who were famed for their Merino wool, had given up those sheep and gone in for Crossbreds, and to get sheep suitable for their country they had bred a long wool and Merino cross, and had established a type of sheep that suited the market, and grew a profitable clip of high-priced wool; but he would again urge them to grow the sheep that would suit the country. Mr. A. J. Wedd said his idea was to mate a good strong Merino ewe and a Lincoln ram to produce a breed for that district that could not be improved by much. With other crosses there always seemed to be a lot of rejects when the lambs were sold. He thought that if they stuck to Crossbreds in the way he stated they would do better than if they went in for other sorts. Mr. Holloway thought South-Eastern sheep men were generally satisfied with the Merino-Lincoln cross. Mr. Henshaw Jackson, the wool expert, was an advocate of the Merino and Leicester cross. Mr. G. H. Kilsby said he had for many years advocated the Lincoln-Merino cross. He thought that if they got them good on both sides they would get an improvement on other crosses in good country. Mr. Crouch mentioned the Hampshire Downs cross. He should like to see that cross tried. They had none in South Australia. When he was in Sydney recently he saw a line of that breed from the Goulburn district, and it topped the market. They were a very fine lot of sheep. They matured early, and were very good cutters. Touching on what Mr. Holloway had said about the Leicester-Merino cross, he might say he happened to be in Victoria when a man, who probably sold more Leicesters than anyone else in Australia, told him that there was a great demand for them, especially in the northern country, but he thought the Lincoln cross would be the best for the South-East. There were only two wool breeds, he said, in the world. The Merino could not be equalled by any breed for fineness of wool, and the Lincoln for weight; and the cross from those would be a fine utility sheep. On the other hand, with the other breeds, one would get a light-woolled cross, and in a short time he would not know where he was. Mr. H. L. Kennedy observed that besides using a sheep that suited the country in large areas they must use a sheep that suited the farm as well. With the big English breeds they wanted a limited area on which to run them. None of the crosses found favor with the graziers like the Merino and Lincoln cross. The cross from the Merino ewe and Lincoln ram was the ideal sheep for the farm. Of course, when the wool became too strong, it would be necessary to breed back by introducing finer-woolled sheep. Mr. A. A. Sassanowsky thought the Merino and Lincoln cross was the most suitable breed for the district. At some future date, if lamb breeding came in again extensively they might go back to the Shropshire. For the ideal freezing lamb he did not think they could beat the black-faced sheep; but for carcass, and particularly for wool, he did not think they could beat the Lincoln and Merino cross. There was another cross coming in favor—the Corriedale and Merino cross. In some places in New South Wales and New Zealand, and also at Millicent breeders were going in for the Corriedale strain. It was a useful sheep; produced a good lamb and a fair fleece of good quality. At sales they brought equal prices that others did. Mr. Ellis had, he thought, gone in for Corriedales for years, and he thought his wool realised practically top prices. But for the farmer, at present he did not think they could beat the Crossbred Merino and Lincoln. The great object was what one could make per acre out of their sheep. In that case it was possible that the Merino might suit them better than Crossbreds, for it must be remembered that where they could keep two Crossbreds they could keep three Merinos, and at the end of the season, when they calculated their returns they might find it suited them better to keep Merinos than the Crossbreds. Mr. McCormick asked, with regard to the Lincoln and Merino cross, how they were to keep the breed up to the standard? Mr. Kennedy said that when the wool of the flock got too strong they would have to go back and cross again with Lincolns. Mr. A. A. Kilsby said last year he got a few Shropshire rams and obtained some very good lambs, but he did not get them for freezers. He was rather afraid that if he did not get them off he would not know where he was. So he got rid of the Shropshires, and replaced them with Merinos. Instead of putting the Crossbred ewes with the Lincoln rams, he put the Lincoln rams with the Merino ewes, and later got Merino ewes and put them with the Lincoln rams, and he thought that breeding in that way they would get a good class of wool and a fair carcass, weighing up to 70lbs. and 80lbs. He had had the distinction of topping the Adelaide market three years running. He thought by keeping on to the Merino ewes instead of mating Lincoln rams to Crossbred ewes, and mating the Lincoln with them again he would get the most suitable sheep. If they kept the Lincoln cross and improved back to the Merino and the Lincoln cross they would get a fine class of wool.

## MOUNT GAMBIER (Average annual rainfall, 32in.).

May 12th.—Present: 20 members.

Objectionable Weeds.—A short address on the subject of objectionable weeds was delivered by Mr. R. Wallace. He mentioned several plants that could well be done without, such as wild radish, blue root (which could be got rid of by pulling), wild turnip, and the red poppy. The Canadian thistle and horehound were also referred to. A general discussion followed, and it was determined, at the instance of Mr. R. Fowler, that members should collect objectionable weeds, table them, and discuss them at a meeting of the Branch.

## NARACOORTE (Average annual rainfall, 22.60in.).

April 14th.—Present 28 members.

Proposed Junior Technical School.—Commencing with the inquiry whether technical education, with an agricultural bias, for boys or girls, was an advantage in agricultural districts, Mr. S. H. Shinckel, in a paper on the proposed junior technical school for Naracoorte, answered the question in the affirmative. In older countries great attention was paid to the agricultural education of children with beneficial results, and the same effect should be produced in that district. Boys especially would be benefited by an insight to the science of farming, which could be obtained on very few farms. Technical education would afford the student an early opportunity in life of learning bookkeeping, besides acquiring an insight into carpentry, blacksmithing, chemistry, analysis of soils, balance in soil solution, diseases of stock, farm botany, insect pests, fungus diseases, and other subjects. In technical schools with an agricultural bias a few acres of land for the purpose of observation and experience in the growing of various plants would be indispensable. It was a good policy to encourage boys and girls to be fond of plant life. The condition of fences, doors, gates, &c., on a farm, where the owner had a knowledge of tools could at once be distinguished as against the holding of the farmer who had no such knowledge. All the pupils attending junior technical agricultural schools would not go on the land, but the education received would be of use in any walk of life.

**KYBYBOLITE, April 2nd.—Mr. Mehren (Danish Agricultural Expert) delivered an address on the agricultural and dairying methods practised throughout Denmark. He also referred to their system of education and co-operative methods, which in latter years had largely increased the production of Danish commodities.**

**TANTANOOLA, April 27th.—Co-operation.—This subject was dealt with in a paper by Mr. J. Carthew. He referred to the many benefits that would accrue to the farmers if the principle of co-operation were more generally adopted, and he urged farmers to protect their interests in this manner. The paper met with a good reception, and was well discussed.**

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CLARENCE GOODE,

*Minister of Agriculture*

# POINTS FOR PRODUCERS.

### Mouse-infected Hay.

Mouse-infected hay is very dangerous to horses because of changes brought about in it by the mice and their dung, also by moulds which grow in it from them, says the Veterinary Lecturer. The best and safest treatment of it is not to give it to them, and there is no other that is reliable. If it has to be given, then one must reckon up its cost in terms of dead horses. A palliative measure would be to open it up before chaffing and allow the sun to play on it for some hours and mix salt at the rate of 5lbs. to 7lbs. per ton with it, and if very bad to mix sulphur at the rate of 3lbs. or 4lbs. per ton with it, but this is best done as it is fed rather than in bulk. Molasses, much as the Veterinary Lecturer dislikes it for horses, may be of some use in counteracting the trouble, not more than ½lb. per day per horse being given.

### Drenching a Pig.

White, in his "Farriery," published over 200 years ago, says when he reaches the section on pigs, "Pigs, like other animals, have many diseases, but you may as well drench the devil as drench a pig." This is good advice, and whenever possible medicine should be given in the food or mixed with honey or molasses on a stick, and so put in the mouth, says the Veterinary Lecturer (Mr. Place). If drenching is unavoidable, take an old shoe or boot and cut a fair sized hole at the toe, snub the pig up in a corner with a slip round the upper jaw, not round the snout only, put the shoe in the mouth, and raise the head, but not over high; when the music ceases pour a little water or milk into the shoe and let it be swallowed. When this is going on satisfactorily, the medicine may follow slowly and steadily. If there is any choking or coughing, let the head down and do not give the rest of the drench.

### Lime for Horses.

Lime is one of the requirements of horses in South Australia that is frequently lacking both in pasture and house feed. It may be given as a tablespoon of slaked lime mixed with feed occasionally, but is better absorbed if given as lime water, says the Veterinary Lecturer. This is made by taking a lump of quicklime as big as a goose egg and putting it into 2galls. water for 24 hours, then decanting off the clear liquor and mixing it with the feed at the rate of half a pint a horse a day or occasionally when it seems to be required because of earth or dung eating, rough coat, and so on. It is a good preventive for worm troubles.

### Alcohol as a Source of Power.

From the Department of Chemistry has been received Bulletin No. 8, being a paper prepared by Mr. W. T. Rowe, F.I.C., on investigation so far conducted for the purpose of ascertaining the possibility of making the manufacture of alcohol as a source of power a commercial success. The Director of Chemistry (Dr. Hargreaves, M.A., B.C.E., F.I.C.), in a letter of transmittal, states that so far as our present productions in South Australia are concerned, we can only look to cereals and straw as sufficient in quantity to provide enough alcohol to replace imported petrol. It may be possible to increase the output of potatoes and make them available. Alcohol can be made from cereals on a large commercial scale; but they form an expensive raw material, and they are more valuable as fuel for human beings and animals than for motor engines. The production of alcohol from straw on a payable basis is problematical, but if further investigation shows that straw can be utilised, it will be a valuable asset to South Australia, where enormous quantities of straw are at present wasted.

### The Paddy Melon

The notes by Mr. F. E. Place, B.V.Sc., M.R.C.V.S., which appeared in last month's issue of the *Journal,* dealing with the Paddy Melon (*Cucumis myriocarpus,* Naudin), says H. W. Andrew (Botanical Assistant and Quarantine Officer for Plants, S.A.), throw some interesting light on the character of another undesirable weed, which unfortunately is well established in many parts of this State and Victoria, though it is a native of South Africa. In Victoria it is known commonly by the more appropriate name of the Gooseberry Cucumber. While Mr. Place has furnished some welcome information concerning the veterinary surgeon's estimate of this plant's injurious effects on horses, it may not be considered amiss to draw attention here to one or two additional points regarding it. That this is a troublesome plant is also borne out by the fact that it is proclaimed a "weed pest" under the Federal Quarantine Act. It is very plentiful along the Upper Murray, and widely spread over this State. Recently, in the Middle North district of this State, I was struck with the thick carpeting—on certain fallows—formed by the luxuriant and spreading growth of the Paddy melon and the degenerate Water or Pie melon (*Citrullus vulgaris,* Schrad.), growing in close association. Scores of thousands of fruits of the latter averaging about 5in. in diameter, in addition to innumerable Paddy melon fruits, must have come under view, and conveyed a vivid idea of the great future increase of plants probably arising on the decay of the fruits and dispersal of the seeds. When it is remembered what enormous quantities of water are given off by the leaves of so many plants it will be realised that these wild melons must constitute a big drain on the moisture content of soils, apart from the mineral foods taken up in solution by the roots. This drain on the reserve moisture of the soil, too, takes place in the case of these plants during the summer and autumn immediately before the sowing of the wheat or other crop for which all possible moisture should be conserved, especially in the drier districts.

**Imports and Exports of Fruits, Plants, Etc.**

During the month of May, 1917, 12,054bush. of fresh fruits, 17,732bush. of bananas, 4,300 bags of potatoes, 404 bags of onions, and 172 packages of plants, trees, etc., 2,161 empty wine casks, and 480 empty cases were examined and admitted at Adelaide and Port Adelaide under the Vine, Fruit, and Vegetable Protection Acts of 1885 and 1910; 58bush. of bananas (overripe) were destroyed, 126 empty wine casks were fumigated, and 480 empty cases were returned to the exporting State. Under the Federal Commerce Act, 176 packages of dried fruit, 110 packages of preserved fruit, and 400 packages of honey were exported to oversea markets. These were consigned as follows:—For New Zealand, 176 packages dried and 110 packages of preserved fruit; for Bombay, 400 packages of honey. Under the Federal Quarantine Act, 2,956 packages of plants, seeds, etc., were examined and admitted from oversea sources.

## BLACK APHIS.

"I advise, from long experience, the use of tobacco and soap wash with a little resin wash added—one pint to each gallon of tobacco-soap solution—as a spray," says the Horticultural Instructor (Mr. G. Quinn) to a correspondent seeking information as to treatment for black aphis. "To overcome this pest about three sprayings at intervals of a couple of days between each should be applied as soon as the presence of the pest is detected. To make the tobacco and soap wash, simmer refuse tobacco, 2ozs. to 4ozs. to the gallon of water, say, for an hour or two, and dissolve the same quantity of common soap by boiling it in a little water and then blend it with the tobacco liquor. To make resin-wash boil ½lb. of soap and 1lb. of washing soda in a couple of gallons of water, and then add 1lb. of finely powdered resin, stirring and boiling until it dissolves. If applied hot this compound is a very effective aphicide."

# INQUIRY DEPARTMENT.

Any questions relating to methods of agriculture, horticulture, viticulture, dairying, &c., diseases of stock and poultry, insect and fungoid pests, the export of produce, and similar subjects, will be referred to the Government experts, and replies will be published in these pages for the benefit of producers generally. The name and address of the inquirer must accompany each question. Inquiries received from the question-boxes established by Branches of the Agricultural Bureau will be similarly dealt with. All correspondence should be addressed to "The Editor, *The Journal of Agriculture*, Adelaide."

[Extraordinary pressure on space has rendered it necessary to very considerably curtail the inquiry department. Replies to those questions of more general interest only have been published; however, every query received has been replied to through the post.—ED.]

## VETERINARY INQUIRIES.

[Replies supplied by Mr. F. E. PLACE, B.V.Sc., M.R.C.V.S., Veterinary Lecturer.]

"J. S.," Forster, reports foals with inability to draw milk.

Reply—The first thing to do when a foal will not or cannot suck is to clear its bowels. This can be done by smearing the finger with glycerine and removing the birth dung or meconium that will be found in the hind gut. Sometimes a piece of soap inserted will do. The mouth should also be examined for structural defects, and sometimes the brown body known as hippomanes will be found in it; if so it must be removed. If a foal cannot draw the milk there is generally some congenital defect, and the mare must be milked and the foal fed with a bottle. Probably in most cases such foals are more economical if destroyed.

"Inquirer," Hamley Bridge, has draught horses itchy on legs.

Reply—The itchiness is probably caused by a parasite known as chorioptic acarine; it may be relieved by dressing the horses legs each evening with a mixture of one part petrol to five parts olive oil. This must not be done with a light anywhere near, as the petrol would catch alight. Also give a flat tablespoon of sulphur once daily in feed for 10 days. Glycerine is derived from fat during the process of soap making.

"B. D.," Wokurna, has roan mare, 8 years, which appeared to have colic about three weeks ago, and improved with ordinary treatment; but now mopes, does not eat, although hungry, grinds teeth, and slimy froth falls from mouth, urine dark, thick, and oily.

Reply—The symptons all point to some of the original drench having gone the wrong way, and a cure is doubtful. She should have improved on the arsenic treatment now being given; but it might be well to change it to 10 drops tr. nux vomica and 10 drops tr. camphor in honey on tongue three times a day for a week.

"E. W. F.," Mangalo P.O., *via* Franklin Harbor, has a pony mare which foundered on sorghum, hoofs coming off.

Reply—As the mischief has existed two months a recovery is not likely, but if treatment is desired, give her 10 drops tr. arsenicum morning and evening on the tongue for a month and dress the feet daily with Stockholm tar, walls and soles. If recovery takes place it will take quite six months. She will do better if she can be kept in wet earth or mud most of her time.

"F. C. T.," Meribah, has horses which foundered on wheat.

Reply—The founder or laminitis is always in the feet, between the sensitive and horny parts. In the two cases in hand the best treatment will be to dress the feet all over with Stockholm tar every day and let them run in a paddock where there is not too much feed. It will also be advisable to give them 10 drops of tr. arsenicum morning and evening for about a month. The tenderness may exist for many weeks until the hoof is renewed.

''A. G. S.,'' Caltowie, has horses rubbing tails and stamping. One, 15 years, with difficulty in working jaws.

Reply—The symptoms of the horses point to worms and lice, search carefully under mane and around tail for these, and if found treat as often indicated in these replies. If there is yellow dust under the vent then worms in the hind bowel will be the trouble, and may be expelled by giving each horse a 6 dram physic ball.

''A. D.,'' Yacka, has a horse sluggish at work, no pain, died two days later. *Post mortem* showed inflammation of lungs.

Reply—The treatment, aconite and nux vomica, were quite right, but should have been given a fortnight earlier. The indications of lung diseases are not well appreciated by farmers in South Australia. As long as a horse can stand he is supposed to be fit for work, where, as when he has anything wrong with his lungs, he is obliged to stand.

''Corconda,'' Hamley Bridge, has horses sore and rubbing.

Reply—The symptons point to lice, the horse has two breeds on him different from fowl lice. Look carefully under the mane and on the shoulders. Stand him in the sun and wash with hot soap and soda water in which there is 5 per cent. coal tar disinfectant, such as British Lysol, and when dry wipe lightly over with petrol one part to olive oil five parts; this last may have to be done daily for some days, and all harness, &c., must be carefully disinfected. Petrol and oil suit for this purpose.

''F. F.,'' Long Flat, has a calf, 4 months old, which would not suck, but has been brought up on bottle; cannot drink easily now, but eats green food readily and chews cud, grinds teeth, weak and miserable.

Reply—Value of labor expended on calf at 8d. per hour, about 50s., value of calf 30d. There is some congenital deformity, and the calf will never make a good breeder, so realise on its skin.

''C. J.,'' Forreston, reports that cows slipping calves.

Reply—It is to be feared that you have the troublesome contagious form of abortion among your cows, and any that have slime about their tail while carrying a calf or after calving must be strictly isolated if you do not want to ruin your dairy. Obtain a bottle of L.G.B. tabloids, Burroughs, Wellcome, and Co., from the chemist. Dissolve one in a pint of warm water in an enamel, not metal, vessel, and with a glass syringe inject into the bearing, and wipe tail and parts with the solution also. Do this once a week for a few weeks. Any cow that has slipped should be so treated daily for a few days after and also before being served. The bull after service should be cleaned with the same, but half strength. All sling calves, membranes, &c., to be burnt, and cows kept away from place where it happened. If any more trouble write to Chief Inspector of Stock, Adelaide, and ask for an officer to inspect.

''W. E. T.,'' Forster, has cows which suddenly go off milk, eyes run, gradually recover.

Rely—This condition is known as ''ting,'' and is a lymphatic fever. Beyond the slight loss from decrease of milk it is, as a rule, not serious. It may be combated by bleeding at the nose vein or giving a dose of opening medicine, such as ¾lb. of Epsom salts.

''A. E. H.,'' Finniss, has sheep with jaws stiff, stand about for a week or so, then lie down for another, and gradually die.

Reply—Stinkwort is highly indigestible, but not likely to bring about the symptoms mentioned, which are very probably due to a fluke. If the liver of a dead sheep is sent to me I can settle this point definitely. Benefit may follow the use of the following lick:—Salt, 40 parts; slaked lime, 10 parts; super., five parts; sulphate of iron, two parts; resin, one part. If the sheep do not take readily to it a little cocky chaff and bran added on top will probably entice them. Of course sheep already attacked will not take the lick, but may be dosed with Cooper's tablets with advantage.

"A. B., Halidon, seeks advice regarding white pigs and sun scald.

Reply—The preventive is to keep black pigs instead, they will pay better at Halidon than white. Otherwise keep them well oiled with some cheap oil, such as train oil or crude vaseline. The Americans have automatic oilers against which the pigs rub. In the mallee a creep through which they had to pass to feed lined with bags stuffed with cocky chaff and well oiled would do.

"A. B.," Narridy, reports horses death from paralysis.

Reply—These are caused by the moulds in hay destroyed by mice. These moulds would in the ordinary course of events not do more than cause colic, but in the presence of bloodworms are inoculated into the blood stream, and mixing with poisons excreted by the bloodworms bring about the fatal results. The toxins are similar to those produced in man by poisonous mushrooms. All the world over the matter is being carefully investigated, but the only thing that stands out clearly is that *if you do not want to lose horses do not give them damaged hay.* Prevention is far better than attempted cure, the latter requires skilled veterinary aid, which is most difficult to get just now, while the former lies in the farmers' hands. The main lines of treatment are empty the bowels with aloes, give quinine as an internal antiseptic, and Fowler's solution of arsenic to affect the worms.

"A. L. B.," Orroroo, reports Merino wether hoggets all very fat on good green grass and saltbush, carry heavy fleeces, bred by owner, and always in good condition, watered at well of good fresh water, have been in mallee and acacia paddock with ewes and lambs. When bad, very deep at flank, like a ewe heavy in lamb. *Post mortem,* bladder very full, big, dark, containing water; about a gallon of water around entrails. Watery under skin and jelly like under skin on belly. Fat around kidney discolored.

Reply—It is quite a treat to come across a man who makes a *post mortem,* and notices what he sees and gives the points necessary, although in this case having got to the kidney fat a cut more into the kidney would have revealed congestion. The points are:—Young wethers, off inferior feed on to good, condition rapidly improving, carry heavy fleeces. All the *post mortem* appearances noted. The disease is the one so often referred to as sarcosporidiosis, caused by a parasite which develops in the blood cells and destroys them, bringing about the congestive and dropsical symptoms noted. Practically all sheep are more or less infested with these, but when the blood is improving, on good feed, then they become more active, and carrying a heavy fleece is a drain on the system, which it cannot support under the circumstances. Often the report is of ewes carrying twin lambs, drain in another direction. Deaths are generally said to be sudden, but here we have an observer who notices early symptons, and puts the practical question: "Would they be fit for food if killed when first noticed?" With the average man probably not, as he would not see them till nearly dead. With this observer they would be fit, but the flesh would probably not set very well, so that they would hardly be first class. Slaughter in the early stages is the best way of handling them. With regard to treatment.—Do not keep them more than a few days on the same pasture, keep moving them round so that at least a week elapses before they come back to the same paddock, because they pick up the parasites from the lower leaves of herbage, and if not biting too tight avoid them, also because a week of sun and air goes a long way to clean a paddock of parsites dropped in the dung. Arsenic is a remedy that does good in the early stages, and a convenient way of giving it is in the form of Cooper's tablets, which can be easily slipped down a sheep's throat. Bleeding at eye or leg veins is of use. And when sheep will take it a lick composed of salt 40 parts, slaked lime 20 parts, superphosphate 10 parts, resin five parts, and saltpetre five parts, will be found to be a preventive. In a case that looks like dying the belly may be tapped by inserting a fine cannula at the lower part of the dropsical swelling; in skilled hands this operation will save several. In moving the sheep it is well to move on to slightly poorer feed when possible so as to check the blood formation.

"W. J. C.," Auburn, asks for preventive measures in the case of horses on mousy chaff.

Reply—The only safe way to deal with such chaff is not to feed it to horses, but if it is a choice between that and starvation, a good deal of labor must be expended in laying it out in the sun day by day so that it can be exposed to the action of the air and light, putting sulphur on it at the rate of about 4ozs. per hundredweight before feeding, also salt and possibly molasses. Drugs are of no use, but if such chaff is fed in quantity the horses' bowels should be kept active with a good dose of Epsom salts, 6-8ozs. each Saturday evening. My personal opinion of the use of such chaff is that it is more economical to burn it than to feed it.

"H. J. J.," Inman Valley, had cow, 12 hours after calving cow milked and calf removed, cow apparently well, given feed and loose hay, 12 hours later cow found unable to rise; 10ozs. of Epsom salts with ginger and saltpetre. Cow gradually grew worse, and as inflammation was supposed to exist somewhere she was destroyed. *Post mortem*, organs normal, inside womb a number of lumps of yellow-colored flesh, honeycombed on outside. The heart seemed very flabby and unlike the heart of a bullock killed for meat.

Reply—The symptoms point to *post* parturient paralysis, commonly called milk fever, or better, dropping after calving. The cow should have had her udder distended with air and been made comfortable, when she would have probably got up in a few hours all right, if the flabby heart described was not diseased, and it may not have been, as such flabbiness sometimes accompanies the upset of the circulation which causes the trouble, this consists of a sudden flow of blood into the large vessels of the abdomen on account of the partial vacuum resulting from the birth of the calf, this robs the brain of its blood supply and so the paralysis results. The condition of the womb was quite normal, the growths described being the cotyledons through which before birth the calf received nutriment from the dam. It is not a good plan to remove the calf and milk out a cow so soon; in the writer's opinion, in cases where the cow is left with the calf and not milked out the disease is very rare.

## DRAKE AS A FODDER FOR STOCK.

"In spite of what some people say, that drake is good fattening food, it cannot be recommended. The plant, *Lolium temulentum*, has the reputation for being the only one of the family *Gramineae* of a poisonous nature. The common name, 'drake,' is a corruption of 'dronk,' or drunk, and the symptoms produced are those of drunkenness," says the Veterinary Lecturer. "Seven pounds of drake have proved fatal to a medium draught horse, and there is little doubt but that continuous small doses have a detrimental effect. It is like whisky, apparently a jolly fine thing, but a poison all the same; the poison is in the grain."

# THE DAIRYING INDUSTRY.

## CONFERENCE OF FACTORY MANAGERS.

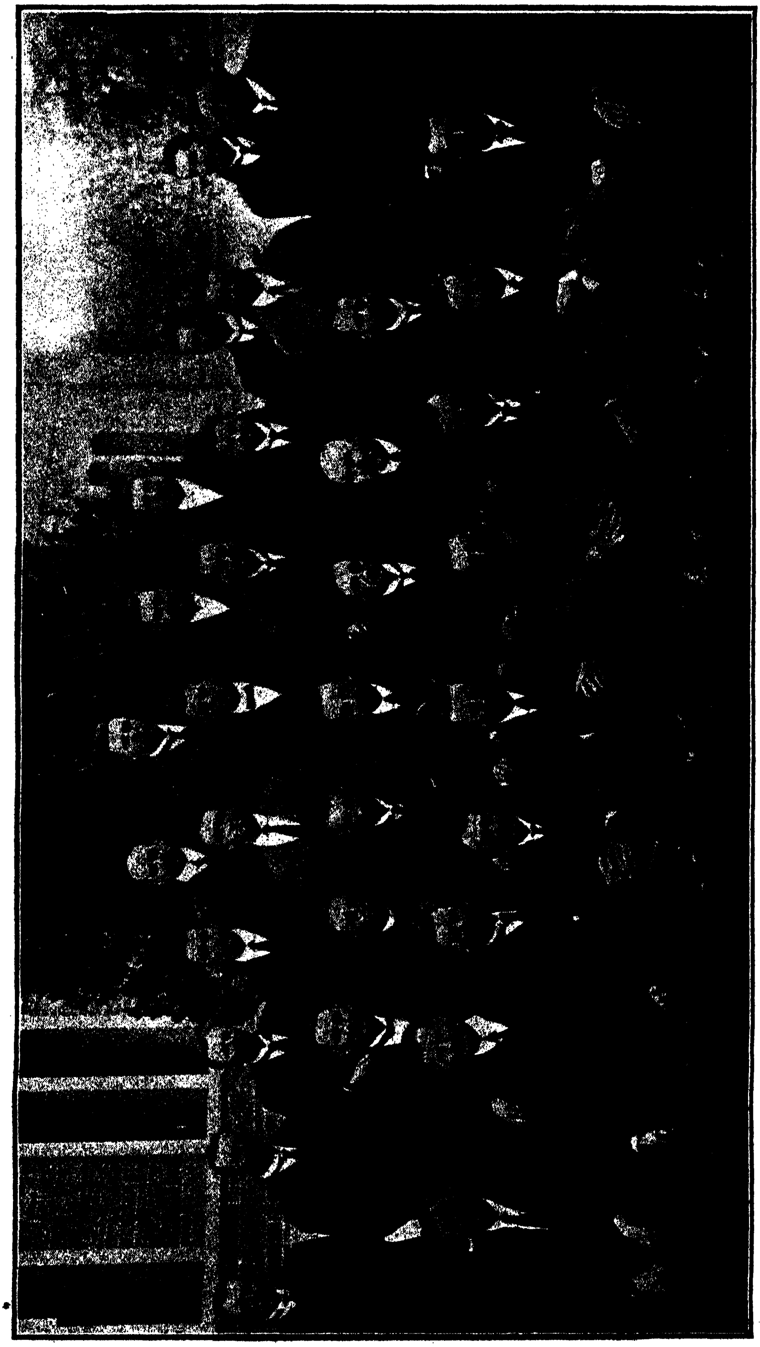
For the first time in this State, representatives of the various butter, bacon, and cheese factories met in conference to discuss the industry, its prospects, and its difficulties.

The gathering was convened under the auspices of the Advisory Board of Agriculture, and the arrangements were in the hands of a subcommittee consisting of Professor A. J. Perkins (Director of Agriculture), Messrs. A. M. Dawkins, C. J. Tuckwell, and the Acting Secretary (H. J. Finnis).

The initial meeting took place in the Wool Exchange, Grenfell Street, Adelaide, on Tuesday, June 19th, the chair being occupied by Mr. F. Coleman (the Chairman of the Advisory Board). Proceedings were opened by the Hon. C. Goode, M.P., Minister of Agriculture.

### A FORWARD MOVEMENT.

The Minister of Agriculture, in the course of an inspiring address, said he regarded the gathering as most important, and hoped that it would be repeated annually. Hitherto South Australia had lagged behind in dairying, but he trusted that this fixture would mark the beginning of a noteworthy forward movement. With the increased attention devoted to the business, the opening up of irrigation areas along the Murray, and the closer settlement of other lands suitable for dairying, the State should be able not only to meet all its own requirements, but also to build up a large and permanent export trade. Statistics showed that the number of dairy cows in the State had diminished from 121,803 in 1911 to 91,181 in 1914 (the drought year). The following year, however, the aggregate had advanced again to 100,662, which included 22,147 heifers of from one to two years. When those young animals came into production, they could look forward to a considerable increase in the output of dairy produce. Recognising the seriousness of the shortage, and the demand for animals by returned soldiers, the Government had, in the last 12 months, imported 620 cows and heifers and 20 bulls from the eastern States. It was encouraging to know that the soldiers already settled on the Wall reclamation area were earning approximately from £2 12s. to £3 a week from dairy products. The Government felt that it was better to encourage the soldiers to engage in dairying than in fruitgrowing, as the former industry apparently had brighter prospects from the standpoint of the State as well as of the individual. (Hear, hear.) It would interest them to know that in 1910 the average production of milk per cow in South Australia was 288galls., compared with 278galls. from the cows throughout the Commonwealth. In 1913 and 1914, however, the South Australian yield had decreased to 256galls. and 244galls. respectively,



Representatives of the various Butter, Bacon, and Cheese Factories, and Officers of the Department of Agriculture who attended the Conference.

whereas the Commonwealth return had advanced to 282galls. and 283galls. respectively. The approximate average production of butter fat in the State per cow was 100lbs., equal to 117lbs. of butter. Twenty-five years ago the average for Denmark had been 112lbs., and the present average for that country was 224lbs. That remarkably fine position had been brought about chiefly by herd testing and selective breeding. The Department of Agriculture in this State was conducting a test of the leading dairy stud herds, and a number of the more progressive dairymen had also availed themselves of the opportunity thus afforded for ascertaining the productive value of their cows. It was gratifying to find that several gentlemen, including Messrs. Peter Wood and Robert Melrose, had launched out as breeders and importers of high class purebred dairy cattle, the influence of which must eventually prove to be very beneficial all round.

### Pigraising Advocated.

Continuing, the Minister indicated that the output of butter in the State had diminished from 9,694,644lbs. in 1911 to 6,317,613lbs. in 1915; cheese from 1,526,930lbs. to 1,412,692lbs.; and cured bacon and ham, from 4,311,497lbs. to 2,432,485lbs. In the same period, the value of the dairy products had risen from £786,200 to £843,829 in 1915. Respecting the export trade, although in 1914-15 only 2 tons of butter was sent away, in 1916-17 the total quantity shipped had been 1,000 tons, which represented the second highest export for any one year. During the last year 31 tons of cheese had been dispatched. This was the first occasion on which cheese in any quantity had been exported, but it must be remembered that the position was due largely to abnormal conditions. To ensure a satisfactory export business, whether in butter, cheese, or bacon, it was essential that a continuity of supplies should be maintained. Simultaneously with the development of the dairying industry, he hoped to witness a marked expansion in pigraising and bacon curing. Every farm ought to carry a few pigs. At the close of the war an attempt should be made to work up with England a permanent trade in cured pork and ham, and possibly fresh pork. At present the Minister of Industry was formulating a scheme whereby the Government Produce Depot would take in the pork at a fixed price for export, and when it fell below that it would be prepared to store it. There was no wish to compete with the local baconcurers; but, instead, it was desired to assist them to build up a permanent and satisfactory export trade. The Minister then emphasized the necessity for saving all heifer calves, especially those from good stock, and concluded—"This is no time for the go-slow policy. We must make progress as fast as safety demands. I regard this meeting as an indication that, so far as the dairying industry is concerned, there is not going to be any more of the go-slow policy. We are prepared to develop it to the utmost of our capabilities.

### FACTORIES IN THE COUNTRY.

At the instance of Mr. C. J. Tuckwell, seconded by Mr. A. W. Shillabeer, a hearty vote of thanks was accorded to the Minister. In reply, Mr. Goode referred to the intention of the Government to establish bacon and butter factories in the country. The Government had no intention to compete with private enterprise in the matter, but felt that, in the interests of the State, it could not allow the dairying business to languish for the want of local factories. The idea was to establish factories in certain districts, especially along the Murray, and then turn them over to the suppliers of the cream and milk to be conducted on co-operative lines. The Government was also considering the question of offering prizes for dairy cows at shows, and special opportunities for the use of selected dairy sires. In the latter connection he felt that it would be well to carry bulls on the railways at a reduced cost. In fact, it probably would pay to transport the animals free of charge, as the amount involved would be more than made up by the revenue from the increased quantities of produce which ultimately would be carried over the railways.

## FROM FARM TO FACTORY.

Mr. A. Taylor (of the firm of Messrs. Taylor Bros., Gawler) contributed a paper, with the title "From the Cowyard to the Finished Butter." He said:—

### THE COW TO BUY.

Purchase the best cows your cash will permit, as a good dairy cow will not eat any more food than a bad one. A cow at about the second calf is a profitable one to buy. The Jersey is recommended as the best butter cow, but we have had some splendid Shorthorns. The latter are a good, hardy sort, and, as a rule, give good milk and butter yields. If the calf should be sold, it will bring a good price in the market, and when the cow has finished her milking days she will fatten up well and earn a good price from the butcher. The Shorthorn cow is generally quiet and good-tempered, a good doer, has nice teats, and is fairly easy to milk. Of course, one wants to be careful to get a cow with a nice even udder and teats evenly placed. When the cows have been selected it is advisable to obtain a well-bred bull, so as to try to improve the herd. A Jersey-Shorthorn cross is a profitable type to favor.

### FEEDING.

Cows always do better when allowed a change of paddock occasionally, as the feed then has a chance to sweeten and freshen up. A good plan is to have two or three paddocks and give them four or five days in each. The feed should not be allowed to get rank and strong, otherwise it will affect the cream. Some object to feeding cows while milking, but I have found that they always appear to be more contented and give their milk down more freely then. I strongly recommend feeding bran during the summer months—an ordinary dipper of bran (wetted with about a pint of water) morning and night every day. It acts as a physic, increases the milk supply, and improves the quality of the cream. During my 23 years with cows I used bran, and I did not have a single cow die or suffer from impaction or dry bible. Cows want a good supply of clean water in the paddocks, and if possible in the yard, where they can always help themselves.

### MILKING.

When yarding the cows, always drive them from the paddock to the yard quietly, at a walking pace. Do not "dog" them in. When yarded let them stand for a few minutes before starting to milk. Every cow has her own position in the yard. Always start milking morning and evening at the same time. Milk each cow in rotation. Let each milker have a bucket of clean water with a cloth in his bail. Rinse the hands after bailing the cow, and wash the teats clean, as there is always a certain amount of dust or dirt about the udder. Wash the hands after milking each cow. It is cleaner for the milk, and prevents the spread of sore teat troubles. If a cow has sore teats, it is best to leave her until last. Sometimes when starting to milk, one nipple will appear blocked up. Put a gentle pressure on that teat, a little vaseline on the palm of the hand, and rub on the nipple gently. Possibly a white stringy substance will then appear. Work that out with gentle pressure; never put the finger nails against the nipple, as they may poison it, and possibly cause the cow to lose a quarter. If a quarter should get hard bathe it well in warm water and rub with soap, leaving the lather on. Sometimes a good rubbing with oil or vaseline will be effective. Always milk a cow fast, with a good, firm, gentle pressure. Do not pull the teats. Milk her right out, and let her go. Never illtreat her in the bail or out of it. Never use the milk of a freshly calved cow for at least five days, but give the milk to the calf. That milk often spoils a lot of cream. A few hot bran mashes are necessary for a cow just calved. If the after-birth does not leave within a couple of days, attention is desirable by an experienced person. Never use the milk of a cow that is unwell.

### SEPARATING.

So soon as milking is over, or if there are two or three hands, let one start separating just before the milking is finished. Keep the milk up to about 98deg. The machine makes cleaner work with the milk warm than when it becomes cold. Always try to have the milk the same temperature each time of separating, and turn the machine at the same pace. This will make the butter yield more even for each can. Do not put the separator together until you are ready to use it. When you start, run right through. Do not follow the milk with hot water, but put about half a gallon of separator milk through to rinse out any cream that may be left. Immediately afterward take the machine apart, rinse in separator milk, which makes it easy to wash, then rinse in cold water and finish with hot water. Dry all parts with a clean cloth and hang up in a well ventilated place. Always wash the separator after it is used, no matter how small the quantity of milk. Keep the cow bails swept clean, and the yard cleaned up every day; it is better for the milk and more comfortable for the men.

### TREATMENT OF CREAM.

When cans come from the factory, scald them out well with hot water, place them on their sides with the lids off in a ventilated, airy place. When required for use, rinse them out with hot water, then a little lime in cold water, and finally rinse out with cold water. Be sure and have a clean vessel to receive the cream from the machine; cool the cream, and do not mix with other cream until following day Then when mixing, stir well every time. Have the separator set so as to run the cream about two to one—that is 2lbs. of cream to make about 1lb. butter, then a 5gall. can will give about 25lbs. of butter. Always keep a clean piece of cheese cloth over the top of vessels that contain cream, to keep out flies, blowflies, and mice. Never keep cream in a room with cheese, vegetables, or fruit; in fact, cream should have a room entirely to itself. Do not keep cream in a cellar in the winter, as it is too close and causes the cream to become mildewed and stale. In summer, always keep the cream as cool as possible. A good plan is to get a clean wheat sack, open it down both sides, and wet it well in cold water and wrap it round the can. This done morning and evening will keep the cream in excellent condition until you have sufficient to send to the factory. After sundown stand the cream outside (weather permitting, of course), and bring in again early in the morning. Send the cream at least twice a week to the factory, and always try to send by a morning train. In hot weather, for long distances, it pays to put a wet bag round the can of cream. The factories will always send the bag back. Thousands of pounds sterling is lost in South Australia yearly through careless handling of cream on the farm. The factory can never satisfy a supplier that sends inferior cream. Dairying properly managed and attended to is the best paying proposition any man can take on, and I would strongly recommend the Government to have a capable, experienced man to call on the farmers at their homes, and advise them how to improve the quality of their produce. To ensure a general improvement in the methods adopted by the suppliers provision should be made for complete inspection and education by Government officials.

In the animated discussion which ensued, the Government Dairy Expert (Mr. P. H. Suter) emphasized the necessity at all times for the cows being provided with a plentiful supply of clean fresh water. He felt that the time had come to ask the Government to introduce legislation which would ensure a general improvement on dairy farms and in some factories. He was convinced that if the second grade butter could be raised to first grade standard it would mean an additional revenue to the producers and the State of £50,000 per annum. Mr. J. Legg (Blakiston) said the greatest curse to the factories was the inferior quality cream. When a complaint was made to a supplier on this score, he immediately said, "Very well, I'll go to so-and-so; he'll take it." Government action was necessary. While the present unhealthy competition continued this difficulty would continue. (Hear, hear.) Mr. Frost (Yahl) submitted that cloths should be barred, and on no account should the use of preservatives be allowed. Mr. Lauterbach (Lauterbach Bros.) considered that the cream and the butter as well could be handled better on the railways. It was better to separate milk at a temperature of from 82deg. to 85deg. than at 98deg., which was too high. Numerous losses of stock had occurred in the Woodside district from so-called dry bible, but since the dairymen had been giving the animals plenty of bran, particularly in the summer time, the mortality had greatly diminished. Mr. Dickson (Petersburg) considered that what the dairyfarmers needed was education. Inspectors should be appointed to visit the farms and have power to take action where such a course was deemed to be desirable. Both the dairymen and the factories should be subject to effective legislation enactments. Some of the cream supplied under existing conditions was unfit for use, and had to be thrown away. Mr. Edwards (Government Factory) recommended the dairymen, while the cream was on the farms, to cover the cans with wire gauze instead of with cheesecloth. Mice ate through the latter, and he had found some of the rodents in cream sent to the factory. That cream, of course, had been immediately thrown out. Mr. Finlayson (Balaklava) said the best preservative for cream was cleanliness. (Hear, hear.) Mr. Clements (Gawler) said he was a heavy user of bran, but considered that crushed oats would be more profitable than bran for the average farmer. to use. Some bran was highly indigestible, and he had had serious trouble with it. Mr. Shillabeer advised dairymen not to allow their cows to tackle lucerne, especially young lucerne, before the morning milking, otherwise the flavor would get into the milk and cream. Mr. Suter, who joined with the other speakers in complimenting Mr. Taylor upon the comprehensiveness of his paper, said milk should be separated as soon as possible after it had been taken from the cows. The temperature should exceed 86deg. Fahr., but be not more than 98deg. Under 86deg. would not allow of a clean separation. It was utterly impossible to make good cheese with milk or cream into which preservative had been introduced. So far as the supplying of inferior cream was concerned, the managers and proprietors of the factories had the remedy, to a large extent, in their own hands. All cream should be paid for according to the correct grade. Kale, lucerne, and other fodders undoubtedly tainted milk, but the chief trouble which the factories had to contend against was the stale flavor. (Hear, hear).

### The Pig Industry of South Australia.

Mr. H. A. Monks (Littlehampton) contributed a very interesting paper on this subject. He said the pig was one of the most important animals we had in the State. First, it was the refuse or by-product consumer for the dairyman farmer and the gardener, and was the means of saving of a large percentage of profit. For human consumption fresh pork, pickled pork, ham, bacon, pigs' cheeks, lard, brawn, mettwurst, fritz, white and black puddings, sweetbreads, chitlings, and tripe were the products of the pig which the consumer enjoyed. The hoofs were of great service, for from these was made the finest glue. Pig hair was also of great value for the upholstering of railway carriages, motor cars, and furniture. America was at present doing a large export trade in this commodity. The pig industry in South Australia had developed very rapidly during the last 15 years, and there were now between one and two thousand pigs killed every week in this State and manufactured into bacons and hams, whilst there was also a large number slaughtered for fresh meat purposes. There was a great future for the pig in South Australia, and in fact all the States of the Commonwealth, and it was one which deserved the whole hearted support of the Government. In order that the development of the industry could proceed more rapidly it was necessary to establish an over-sea trade. But in this connection there were certain regulations that would have to be observed. The clauses of the Commerce Act were very rigid, and few people were aware of what was required before the product of the pig could be placed on board ship. The Act demanded that the premises upon which the pig was slaughtered should comply with certain regulations, the live pig was required to be passed as being healthy, the carcass deemed fit for human consumption, and the cured meat also submitted for examination. The premises must be registered and numbered.

### GOVERNMENT ASSISTANCE.

In order that the pig industry might progress and be kept in a healthy condition, it was necessary that the State Government should render it assistance, not from a financial standpoint, but from an educative viewpoint. He suggested that a qualified man should be appointed by the authorities to lecture before the members of the various branches of the Agricultural Bureau throughout the State and endeavor to educate the farmers and pigraisers as to the possibilities of the industry, the best means of breeding, feeding, and marketing pigs, the best types to keep, how to keep them, and the best time to market, so that they would present the greatest value from a bacon manufacturer's point of view. Pigs from 100lbs. to 150lbs. were the most profitable sizes to market, while those ranging from 120lbs. to 130lbs. were the most called for. Many people kept the animals too long, then sold them when they became heavier, but the extra weight did not realise proportionately. That was where the instruction of a lecturer would be of great value. If he were appointed for a period of two years he would in that time have done a great deal of good and would have materially assisted the industry. His services would be greatly appreciated by both the producer and the manufacturer. The overseas trade in frozen pork, tierce pork, green bacon, and prepared bacon would be considerably helped if information were given, as coming from the Trade Commissioner, as to the size and quality required for the English market. These were a few points which he thought would be of value in the development of the industry, and one which in the near future would be one of the most profitable in the State.

Mr. E. W. Mitton (Messrs. Sandford & Co.) thought it desirable at the outset to ascertain precisely what was required for export purposes. Mr. Monks replied that the practical man appointed would be expected to possess a knowledge of those requirements. Mr. Apps (Assistant Government Expert) said a Victorian authority had informed him that the pigs required in the form of bacon for the London market should weigh from 200lbs. alive and dress 150lbs., thus providing sides which roughly went 56lbs. each. It was far better to export the bacon in the green state and allow the product to be treated when it reached the old country. Singeing, which gave the skin a smoother appearance and a nice, nutty flavor to the flesh, was necessary.

Mr. J. G. Murphy (Messrs. Murphy, Fromen, & Co.) then read a paper on Government Competition *versus* Government Assistance in relation to the Dairying Industry.

## RESOLUTIONS.

### PAYING FOR CREAM.

Mr. D. Hammond (Quorn) expressed the opinion that it would be advantageous all round if a uniform basis for the payment of cream were adopted throughout the State. He personally favored payment according to the percentage of butter fat, but another system took account of the amount of commercial butter produced. Mr. Suter mentioned that he proposed, when fresh dairying legislation was being considered, to move for the compulsory adoption of a uniform practice. Mr. Brice submitted that the fairest method was to test the contents of every can, and pay for the butter fat. Mr. Suter explained that the commercial butter content was the basis generally adopted, and he thought the best plan would be to continue it, as the farmers understood it. At the instance of Mr. Hammond it was decided that "a recommendation be made that it be compulsory for factories to pay for cream on the commercial butter basis according to O'Callaghan's chart, which provided for a 17½ per cent. overrun."

### GOVERNMENT INSTRUCTORS.

On the motion of Mr. Dickson, seconded by Mr. Finlayson, it was decided—"That this conference recommends the Government to appoint instructors and inspectors to visit the dairy farmers and factories."

### FREIGHTS.

Mr. Finlayson proposed, and Mr. Edwards seconded—"That this conference desires to impress upon the Government the need for taking immediate steps to secure shipping space for butter during the coming season." This was carried.

### RAIL FACILITIES FOR DAIRY PRODUCTS.

Mr. Dickson proposed, and Mr. Finlayson seconded—"That seven delegates be appointed to approach the Railways Commissioner with a view to providing better facilities for the conveyance of farm and dairy produce on the railways during the summer months." Messrs.

Dickson, Finlayson, Monks, Taylor, Brice, Mitton, and Frost were appointed, and waited on the Commissioner on Wednesday, June 20th, at 3.30 p.m.

In the evening the Dairy Expert (Mr. P. H. Suter) delivered an address; this will appear in a future issue.

### AN ANNUAL CONFERENCE.

It was unanimously decided that, in view of the success of the gathering, the Government be asked to make the conference an annual fixture.

### VISIT TO GOVERNMENT FACTORY.

On Wednesday, June 20th, the delegates journeyed to Port Adelaide to the Government Butter Factory. After a general inspection of the premises had been made, a number of samples of butters submitted for export were examined, and the Dairy Expert (Mr. P. H. Suter) dealt with the defects met with and the remedies to be adopted. Carelessness in packing, as evidenced by the dirty appearance of the papers and the presence of air spaces in the boxes, was the most noticeable trouble.

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# A SUITABLE FARM HORSE FOR SOUTH AUSTRALIA.

An address to the Mount Barker Agricultural Bureau by FRAS. EVELYN PLACE, B.Sc., M.R.A.S.E., B.V.Sc., M.R.C.V.S. (Government Veterinary Lecturer, South Australia).

The Mount Barker Agricultural Bureau, having done me the honor of asking me to express my views on the subject of the class of horse most suitable for farm work, have set a task that is not easy of accomplishment, and at best is only an expression of personal opinion on my part. It is by no means an easy task to lay down rules of selection for the lines of the most suitable horse for farm work; but, fortunately, Mount Barker is so situated that the horse most suitable for this district will not be unsuitable for any other.

So many factors arise to qualify various points that one has to bear them in mind and assess their relative value when breeding, and there is no doubt that the various breeds of draught horses owe their peculiarities to climate, the contour of the country, the soil, the atmosphere, and weather conditions in which they are reared, as witness the heavy breeds of Britain.

It is this series of facts which shows that this Branch is wise in discussing the subject, because the preponderance of two heavy breeds has somewhat blinded the breeder's eye to the advantages possessed by other breeds, and the necessity for breeding for the special conditions obtaining in South Australia. The growth of the two premier breeds of heavy horses in Britain proves this, and is highly interesting, for despite possible objections from some of my friends "frae ayont the

Tweed,'' their history goes a long way to prove that the Clydesdale and the Shire are but developments of a common stock, much intermingled as time has gone on, and yet remaining distinct under different climatic and telluric circumstances.

### THE CLYDESDALE.

To briefly outline the history of the Clydesdale, there was a hardy native stock to commence on, and after the union of the two kingdoms in 1603, a droving trade of a pacific character sprang up, resulting in the importation of English blood, selected colts and fillies, whose ancestors had, a century or so before, been imported into England from the Continent of Europe.

In 1750, or thereabouts, John Paterson imported from England a black Flemish stallion, and mated him with mares already at Lochlyoch, related to him, and from this strain comes the white always looked for in a Clyde. Somewhat later Yorkshire coaching blood was probably introduced. In 1827 the Highland Society set about fixing the present colors by prohibiting any but black bays or brown bays at their shows. But the introduction of Shire blood is by no means ancient history only, because in the seventies of last century ''Tintock,'' the grandsire of ''Lord Salisbury,'' was imported, and took prizes. The Shire mare ''Old Brickhouse'' also went north to breed Clydes, and Lawrence Drew bred ''The Prince of Wales'' to Shire mares, and ignored the Clyde stud book.

### THE SHIRE AND SUFFOLK PUNCH.

The Shire is the heaviest of all British breeds, bred both in the Fenshires and the Midlands. His ancestors date back a thousand years as the Great Horse, the War Horse, the Old English Black Horse, the Strong Horse. Caesar appreciated them sufficently to send some to Rome, and in the middle ages a doughty knight in armor rode over 25st., and required a weight carrier; from such we get the massive frames and limbs of the Shire of to-day. Much as we owe to gallant Belgium, to-day, we are also indebted in the past because she kept pure the race of black horses, so that the Romans derived the most powerful horses from Belgic Gaul, and the British bought them later when Alva's armies devastated the Lowlands.

The Suffolk Punch was derived from native stock early crossed with Norwegian blood, which also shows in the Norfolk trotter. The chestnut Suffolk has many good traits in his character, but will not stand too much criticism; his Norwegian ancestry was none too good, but strongly dominant. A warning to those who would rashly try experiments in breeding. I am not going to decry him, nor damn with faint praise, but he will not figure largely in my views of a suitable horse.

Conformation for draught differs in many points from that required for speed; but the old adage applies to draught and blood alike—''A good horse has many good, few indifferent, and no bad points.'' Granting this, we must consider the conformation of the draught, for good points in a horse are not matters of ideal beauty, but have sound mechanical reasons, likewise a sound mechanical objection can be raised for every bad point.

But our conditions in South Australia demand consideration of two propositions—Are we to demand strength as opposed to speed, or are we to look for strength combined with speed? An excellent climate, soil on the average fairly light, comparatively low hills or expanses of plain, all point to strength plus speed. There is no call for excessive weight, such as Lincolnshire requires; there is no call for fancy feather, such as shown at Glasgow or Islington.

### The Type Required.

We are told that the Devon pack horse, the Cleveland bay, the Yorkshire coaching stallion are all extinct or practically so; else in any one of them we have the type of mare we want. But it is no good looking for the unobtainable. We must take the mares we have, many of them very similar to the breeds just mentioned, many of them, alas, very unsound, but the material on which we must work to arrive at a grade type suitable for our conditions, conforming to the following requirements:—Color; no good horse is a bad color, but whole coats, dark shades, and dapples are to be preferred. Such coats betoken sound constitution. Much white is a disadvantage here, where we have strong sun, the rays of light causing nervous irritability by striking on large white patches. And, starting off the mark, let us try to have black points; the white legs and hoofs occurring in so much fashionable blood to-day are not desirable. Height, 15.2 to 16.2; apparently a low type, but our conditions do not require a very big horse, and certainly not a tall one, a difference that will become apparent later. Temper, mild, but plenty of vigor and nervous energy. Head, fine and clean, a little on the small side for mares; the jaw broad, but not heavy; the nostrils wide and open, the muzzle firm and broad; the eye bright and dark, full and vigorous; the forehead full and broad between the eyes and tapering to the poll; the ears quick and fairly long, but without any tendency to droop; the neck medium in length, massive, and arching. The back straight and broad, the tail well set on, the ribs well sprung, the last one long, for shortness there gives a light leggy appearance, a fault in some Clydes; the hindquarters broad and long, low set, well packed, and thighs muscular, the gaskins or second thighs well developed and broad. The girth round the heart good, for the body is then deep, and the horse looks big; the breast broad and deep; the shoulder not too straight nor too sloping, a little heavy from a light horse point of view, and not so muscular as a Shire requires, for a long, quick step is necessary. The forelegs straight and strong, no calf knees; the muscles of the forearm long, strong, and broad on side view; knee joint broad and flat. Below the knee the bone should be short, flat, flinty, and clean, with tendons to match. Fetlocks large, and if hair or feather is present, it should be fine, long, and silky. Short, coarse, matted hair always indicates low breeding. Legs and feet must be sound and straight, a tendency to pigeon toe is preferable to a disher. Hoofs by preference black, for they are stronger, hard, and like rubber; better a little on the small size for the size of the horse. Wide, open, flat, weak feet are very undesirable. The hocks should be broad in front, wide at the side, and square set, not straight, neither should they be at all crooked. The pasterns of medium length and clean, for South Australia a little tendency to shortness may be tolerated. The action free and pony like, *i.e.*, active and strong; the horse should walk four miles an hour easily. The following cardinal points are imperative:—Good feet, good legs, good walking action, robust constitution, size, soundness, and substance.

There is a tendency in France and America to gauge horses by weight, and it would be well to introduce some consideration of weight here, for the weighbridge is always handy. If one takes a 1,700lb. mare as a standard, the efficiency in work of a 1,450lbs. is 90%, that of a 1,200lbs. 80%. The heavier colts mature and sell earlier at higher prices. Heavier machinery can be used and less human labor.

### THE PERCHERON.

Having laid down the lines required, it may justly be asked, Where can sires to get such be found? In South Australia there are Shires and Clydes that may be used with judgment, and their offspring selected to found a type. But America and Canada, wanting the class of horse described, were more free from what, without prejudice, I may term British insularity, and they went to France for the Percheron, which, springing originally from the same Flemish stock as the Shire and Clyde, were crossed with two grey Arabs called "Godolphin" and "Gallipoli" (surely a token for Anzac farmers), and the result of careful Government selections and individual judgment has succeeded in producing just such a draught horse as South Australia requires.

I am indebted to Mr. Wayne Dinsmore, the Secretary of the Percheron Association, U.S.A., for interesting statistics of the breed in America, and find that over 60% of the importations into America are Percherons, Shires and Clydes coming a bad third and fourth. Six out of 12 international championships for best draught geldings have been won by Percherons. We generally consider Americans keen business men, and these figures speak for themselves.

England, too, is waking up, and frequently my veterinary colleagues on the western front speak in the highest terms of these horses, which are being sent to England in increasing numbers. I quote the following from an officer at the front:—

"If you get a horse of the Percheron type, he will do you justice. They eat less, and do themselves better. The features of the Percheron breed are:—Intelligent heads, firm ears, faces broad between the eyes, very near to what we know as the 'pony type.' They are cresty on top. The shoulders are of good depth and free from lumber, and have a very fair lay. Backs are short and wide, and loins strong. Quarters powerful and deep, a little round, perhaps; tails nicely up; ribs deep and round, and deep round ribs are desirable. Viewed sideways, the Percherons are somewhat punchy and good looking sorts, and from front and rear they are wedgy, firm, and wide. They have a leg set at each corner, and such legs are short and have a plentiful supply of bone. They have enough hair to give protection, and yet not enough to be a nuisance, and they are very free from cracked heels in these oceans of pure, unadulterated mud. In actual height they are not very vast, but in bulk (which is infinitely more important) they are big, strong, and low, with weight enough to shaft a load. Short on top, they have bottom lines which cover a fair space of ground. They are quick and active, can start and stop a load on the nail. They walk with a good, square, swinging pace, and keep it up, and can trot on with nice clean, straight action. The Percheron can walk in front of his load at four miles an hour, and trot back empty at seven or eight, and it is a rarity to meet one in the sick lines. You may think I am over enthusiastic; but I started with a prejudice against them, and speak as I find them. I do not claim that Percherons are "super-horses," equine paragons, but I do claim that for their stature they are the most useful, active medium draughts I have met."

So much for a biassed Englishman's view. Compare his remarks, unknown to me when I wrote the above requirements, and I think you will find that the Percheron will fill the bill. At least one at Canowie has done so, if his grade progeny may be taken as a test.

It is all very well to speak *ex cathedra,* but one may reasonably be asked his reasons for his statements, and if I may be permitted, I would like briefly to do so.

### THE MECHANICS OF THE HORSE.

It is a matter of applied mechanics, and if I digress and become a little too technical for the average man on the land, I must ask your forbearance. The horse is a tractive motor, for our present purposes, and as such we must jettison preconceived ideas regarding points of beauty, and consider his mechanics.

The centre of gravity of a body is not its middle, but is drawn nearer to the parts which weigh the most, and in the horse is constantly shifting as he moves; but, speaking generally of the horse at rest, his centre of gravity may be found at the intersection of a vertical line that would be near the eighth rib and pass through the gristle at the end of his breast bone, and a horizontal line that might be drawn from the point of the shoulder to the lower part of the upper third of his thigh bone, the lines, of course, passing through his bulk. The weight of the horse's fore end is about one-ninth greater than the hind, and the position of the head causes the weight of the fore extremity to differ from the hind by some 20lbs.

Equilibrium in mechanics is the state of the body induced by the forces which destroy one another, or which are annulled by a resistance. The horse's body does not rest upon the ground, but is supported by four columns, the limbs. The plot formed by the lines joining the four points which touch the ground at rest forms the base of support; it is sometimes a triangle, sometimes a line, and may even be only a point. But whatever the form and extent of the base of support, it is necessary in order to obtain equilibrium that the line of gravitation meet the ground within this base; the equilibrium will be so much more stable as the base of support becomes larger, and the line of gravitation nearer the base. In other words, a heavy horse with spindle shanks and narrow chest will have unstable equilibrium. Instability of equilibrium gives the measure of speed, as the limbs are displaced with a greater rapidity to support the body; hence our draught horse must be deep in the girth and low on the leg.

### The Levers.

The levers of the body are the bones, and the power that works them the muscles. The volume of the muscles gives the measure of their force, their length that of speed, so our horse must have massive muscles on back loins and quarters, long ones on short bones in the limbs. The legs are the supports and natural motors of the body. They consist of large masses of muscle at the top, and diminish to jointed columns of skin and bone as they go down, an arrangement which disseminates and attenuates the combined actions of weight and velocity, for if they were clothed with muscle right down, as in the elephant, their weight would be excessive, and the step heavy and slow, because of the size of the limbs and the lowering of the centre of gravity. The forelegs are a little in front and close to the centre of gravity. Their principal work is to support the body, and disperse concussion. As propellers they only come into play in moving a heavy load at a slow pace, when the forelegs slanting backwards give a push at the collar, a trick mechanical motors have not yet learnt. This is brought about by the extension of all their articular angles when the toes are fixed into the ground, as may be seen by the slide a horse gives if the ground at this point of support gives way. The mechanism of the front legs as a means of support is admirably arranged from the point of view of conservation of energy; they sling the body by their muscular attachments, they support it at rest by their arrangements of bones, ligaments, and tendons.

The hind legs are built differently. They do less in support of the body, and are joined firmly by a bony joint to the bones which form the main column of the backbone. By the movements of their different segments they push against the trunk, communicating force or speed by the obliteration of their angles. As the muscles have to contract to oppose the closing of the angles of locomotion, they are bigger and more numerous than those of the forelegs, and while doing their duty as supports, their main work is to propel. They act with most ease and power when their line of direction points obliquely downwards and backwards. The muscles and tendons of the hind legs are so arranged that one articular angle cannot be extended without at the same time opening all the rest, producing a process of force accumulation, which, when exaggerated, is seen as stringhalt, when wanted for support, gives us the attitude of the foundered horse. This sketch of equilibrium will naturally bring to our mind's eye the proportions of the horse, and men have often tried to give, by tape and callipers, measurements that should enable any mechanic to be a good judge of form. They have failed, for they lose in isolated details the general sum which a good judge of a horse works out by his trained eye. But the task is not insuperable, and may one day be accomplished, as certain measurements in the sketches tend to show. The mechanics of the limbs is too intricate a subject to enter upon to-night, but it may be noted that the difference in the action of the shoulder in the blood or draught depends not so much on different formation as upon the upper angles of the limb being more open in the draught, because of the greater rigidity of the limbs required in pulling. Our draught horse does not require lumber on his shoulders, but shorter and therefore relatively stronger muscles than the blood. The judge applies these principles by estimating the closure of the angle of the shoulder by its height and slope. And he judges the angle of the hip by the straightness of the croup. He unconsciously estimates the relative values of the angles of the lower parts of the limbs from these.

When a man sets out to build a motor, the vehicle upon which the engine is mounted has to comply with certain conditions of height, length, and width. The same relationship applies in the case of the horse, only Nature lays them down instead of the engineer.

The height of the horse as usually measured at the withers teaches useful lessons. A lowering of but fractions of an inch at the withers brings more load on to the front legs; hence the advantage of a horse being cresty. A lowering of the croup results in over strain of the hocks; hence the frequency of bog spavin in certain fashionable breeds. The sum of the height is composed of the factors of body and legs, and if they are not accurately adjusted, our machine may go badly wrong; 17.2in., mostly daylight, is not as strong as 16.2in., mostly muscle. The length, judged by a line from the hind angle of the blade bone and the angle of the haunch, is usually the length of the head in a well-formed horse.

If we vary the height of a well-formed horse without altering the relations previously existing between his body and limbs, he at once seems too short; the centre of gravity has been raised without enlarging the base of support. The body will overweight the legs, which will have become longer without increasing his speed, because he will overreach. We have a locomotive unstable in equilibrium, weak in its parts, made taller to go faster, and failing to do so because of imperfect adjustment. A narrow, tall, forging, stumbling weed. We get on better if we lower the height, but our motor becomes massive and slow, and conditions in South Australia require a fairly speedy one; hence the height of our horse should be in the girth of his heart measurement. Width, of value in the draught, can be overdone, but practically seldom is, for depth and width mean much heart room, robust lungs, and lots of room for dinner or a foal.

The limbs must be in proportion, for large wheels moved by a strong crank are no good to a locomotive if its boiler and piston are incapable of moving them; while, on the other hand, the best of bodies is powerless with weak, ill-adjusted wheels; without force, without solidity, without speed, it will soon wear out, be it horse or motor. The fault can be checked, for between girth and pastern in an ordinary beast will be a head's length; a little longer in a large horse, a little less in a small one.

William Shakespeare, the butcher's boy, or Bacon, the mathematician, had not looked on a horse in vain when one of them wrote—

So did this horse excell a common one,
In shape, in courage, color, pace, and bone,
Round hoofed, short jointed, fetlocks shag and long,
Broad breast, full eye, small head, and nostril wide,
High crest, short ears, straight legs, and passing strong,
Thin mane, thick tail, broad buttock, tender hide.
Look, what a horse should have he did not lack.

# COMMONWEALTH ADVISORY COUNCIL OF SCIENCE AND INDUSTRY, MELBOURNE.

## INDUSTRIAL ALCOHOL. A SUBSTITUTE FOR PETROL.

The question of finding some substitute for mineral oils as a fuel has attracted a considerable amount of attention in various countries in recent years. Already the price of petrol in Australia has increased from 1s. per gallon in 1908 to 2s. 7d. in 1917, and if the war continues there is a prospect of a serious shortage of petrol in this country, if not even of a complete cutting off of the supply. Even if the war ends soon the supplies of mineral oil are practically stationary, while the world's demand is increasing rapidly. As there are no payable oil fields in Australia the question is of importance and urgency.

In April last the Commonwealth Advisory Council of Science and Industry appointed a special committee of experts to inquire into the production of industrial alcohol in Australia, and the design and manufacture in this country of engines suitable for using alcohol in place of petrol. This committee has now issued its first progress report. The committee draws attention to the fact that alcohol possesses various advantages over petrol as a fuel. In the first place the products of combustion in an alcohol engine are practically odorless and free from smoke. Secondly, the risk from fire in storing and handling alcohol is much less than in the case of petrol. Thirdly, there are many theoretical, chemical, and physical reasons why alcohol should yield superior results. It can be used without danger of pre-ignition under high compression, and it can yield a much higher percentage of its available heat contents in the form of work. Lastly, alcohol is produced in Australia, and, if necessary, can be manufactured here in largely increased quantities.

The main aspects of the problem that have to be solved are (*a*) The design and manufacture of the engine; (*b*) The supply of alcohol and its distribution; and (*c*) The denaturation of the alcohol, so as to render it impotable.

The engine problem does not present any serious difficulties, as alcohol has been used for a number of years with success in other countries, notably Germany. The main difficulty is that alcohol engines cannot be started from cold, and some special device for pre-heating is necessary. The committee is taking steps either to purchase or have constructed an engine or engines and to use them for demonstration purposes.

The supply of alcohol is a much more difficult problem than its utilisation. At present the cheapest source for the production of alcohol in Australia is sugar molasses, but even if the whole supply of molasses were used it would be sufficient to produce only about 4¼ million gallons of alcohol, whereas the annual importations of mineral oils are about 17 million gallons. If petrol is to be replaced by alcohol it will therefore be necessary to use some source in addition to, or in place of, molasses. If alcohol cannot be profitably made from waste or raw materials not at present used, such as prickly pear, sawdust, and waste timber, grass trees, waste fruit, and vegetable refuse, it will be necessary to grow special materials for the purpose. The most likely of these are maize, potatoes, wheat, barley, and beet. The committee is investigating the cost of production on a commercial scale of alcohol from various sources.

The denaturation problem also presents considerable difficulties. Under the present Excise regulations alcohol has to be mixed with other ingredients to render it impotable before it can be sold as methylated spirits. If alcohol is to come into general use as a fuel it will be necessary to find some cheaper denaturants than those now used; otherwise the Excise regulations will make the price of the fuel too high. If these difficulties are met in a liberal and progressive spirit there is no doubt that they can be overcome. When this is achieved, not only will Australia cease to be dependent on other countries for a fuel which is essential, but many new industries will open out both directly and indirectly as a result of the change. From the Imperial point of view it is important to secure uniformity in regard to denaturation, so that industrial alcohol distilled in one part of the Empire may be exported for use in other parts. With this object in view the committee is co-operating with the Imperial Motor Transport Council, London.

The committee inquiring into the question will be glad to hear from persons who are interested in their work, and will be pleased to make available all information in their possession. Communications should be addressed to the Secretary the Commonwealth Advisory Council of Science and Industry, 314, Albert Street, East Melbourne.

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## POTATOES FOR PIGS.

Pigs do better on boiled potatoes than on raw, which sometimes set up indigestion, but the water they are boiled in is not good for them, owing to the potash in it. However, if grain, or pollard, or bran is boiled with them, then the whole can be given them together with advantage.—F. E. PLACE, B.V.Sc., M.R.C.V.S.

# PHYLLOXERA AND AMERICAN VINE STOCKS.

## THE ARGUMENTS FOR AND AGAINST THE ESTABLISHMENT OF A NURSERY FOR PHYLLOXERA RESISTANT STOCKS IN SOUTH AUSTRALIA.

The question of the protection of South Australian vineyards against a possible invasion of phylloxera received a good deal of attention at the Conference of River Murray Branches of the Agricultural Bureau, when Mr. H. S. Taylor introduced the question on behalf of the Renmark Branch, and Professor A. J. Perkins gave expression to his views on the matter.

At the previous Conference, the following motion had been tabled:—"That this Conference, having in mind the difficulties experienced in Victoria in obtaining sufficient phylloxera-resistant stock for the reconstitution of their vineyards, urges that steps be taken by the South Australian Government or the Phylloxera Board to ensure, against the time when it shall be needed, an abundant supply of resistant stock of varieties and hybrids of probable adaptation to the river soils, and of proved affinity with the scions of European varieties required for winemaking, and especially for drying purposes. We urge therefore that early steps be taken to establish a nursery for phylloxera-resistant stock under conditions that will obviate any possible danger of the introduction of phylloxera to the State by this means, and to this end suggest Mildura as a suitable site for this purpose, Mildura being a phylloxera free district, and resistant stock having been established there for at least 12 years."

At that time consideration of the question was deferred, and Mr. Taylor was requested to supply a paper, setting out the views of the Renmark Branch on the matter. The position taken up by that Branch, he explained, was that they did not want South Australian vinegrowers ever to be in the same position that Victorian vinegrowers were in for many years—their vines destroyed by phylloxera, and they unable to replant their vineyards because the supply of reconstituted vines was so far short of the demand.

### THE POLICY OF ISOLATION.

South Australian vinegrowers were certainly indebted to the authorities, and particularly to Professor Perkins, he said, for the policy of exclusion which had kept their vineyards unphylloxerated for so long, but the pest would sooner or later invade the State, and it was open to discussion whether the policy of refusing to lay down a nursery of resistant vines was a wise one. Sixteen years ago, with phylloxera rapidly spreading throughout Victoria, and the prospect of Mildura being linked by rail with outside parts, the Horticultural Society there decided to establish a nursery of resistant vine stocks, moved by a desire to test the adaptation of different American stocks to

Mildura soils, and the affinity of those stocks to popular local vines. That was done, and after 15 years with American vines in its midst, Mildura was still free from phylloxera.

He explained that whilst American vines were all more or less resistant of phylloxera, they were far less tolerant of variations in soil than were the European vines. The recognition of these facts had led Mr. F. de Castella to say that it was only by experimental work in each locality, extending over a series of years, that the true value of any stocks for any given locality could be accurately determined. Mr. Taylor laid special emphasis on the marked effect of variations of soil on the choice of American stocks, and mentioned the experience of other countries, and their applicability to South Australian conditions. It might be well argued, he said, that experimental stations for vines for American stocks should be established in all vine-growing districts in South Australia.

### THE SUPPLY OF STOCKS.

It had been stated that private nurseries in South Australia would very quickly produce all the stock needed by South Australian growers, but such a matter should not be left to private effort, except under strict Government supervision, aided by a Government subsidy. Unless growers were to be unfairly handicapped, they should be supplied with worked resistant stock at something below the cost of production, and the accumulated funds of the Phylloxera Board might be better employed, where the necessity arose, in making available reconstituted vines at a cheap rate, rather than in a too long expenditure on carbon bisulphide.

Whilst the American vines were resistant to phylloxera, they were not necessarily free from it, and the introduction of infested stocks, resistant or non-resistant, would speedily lead to the spreading of the insect. To eliminate the risk, it was suggested that cuttings should be obtained from Mildura. The collection available there was certainly incomplete, but would be worth starting with; but the addition of other varieties of good repute, properly treated, and raised in some isolated place until proved free from infection, would greatly add to the value of any nursery that might be established.

It was argued that if there were vines planted on resistant stock in a district, phylloxera might exist on the roots of these vines, and there would be no means of detecting it. But the disease was no more likely to be introduced on American than on European vine stock, and if the disease did come, the man who had planted portion of his vineyard with resistant stock would at least have the satisfaction of knowing that that part of his investment was safe.

If phylloxera existed only on the roots of the resistant vines it would do no harm, and if it spread to the adjacent vinifera, as of course it would, it would be detected there just as soon as though there were no resistant vines in the district.

The argument against the introduction of clean resistant stocks rested on the assumption that in future the measures to prevent the introduction of the disease would be as successful as they had been in the past, and on the belief that the reconstitution of vineyards was a last desperate resource not to be adopted until all other methods had been exhausted. With regard to the first, South Australian growers had no guarantee of immunity for the future. Ignorance, thoughtlessness, and possibly even malice had to be reckoned with. As to the second, Mr. Raymond Dubois had stated:—"Phylloxera eradication, and even localization, had failed in every country; it would therefore be sheer folly to establish new vineyards in Victoria, or near infected areas, except on phylloxera-resistant stock, as this method alone insures permanency." Mons. P. Viala (Inspector-General of Viticulture in the National Agricultural Institute, Paris), stated:—"All other processes or methods of combating phylloxera can only be of transitory value, and only prepare, more or less progressively, the way for reconstitution with American vines."

### PALLIATIVE METHODS.

Out of 6,000 methods suggested to the French Government as effective means of coping with phylloxera, only four gave any promise of practical value. These were summarized as submersion, planting in sand, the use of insecticides, and the reconstruction of vineyards on American stocks. The first two were found to have only a very limited value. The use of insecticides gave greater promise of success, as it was found possible to hold the disease in check by means of annual injections in the earth of carbon bisulphide, or the use of sulphate carbonate of potassium. Immense sums had been spent in the bisulphide and extinction process; the cost in Victoria, it was said, amounted to £50 an acre for all vineyards treated. In New South Wales the figure reached £300 for every acre affected by phylloxera. Victorian legislation of 1880, 1881, 1890 gave the Minister power to direct the destruction of all vines growing in an affected vineyard, or within a three-mile radius of any diseased vineyard, and replanting was prohibited for four years after the uprooting of the old vines. It was not for 15 years after the discovery of phylloxera that these measures were abandoned and the importation of American stock sanctioned.

In France it had been recognised that the reconstitution of the vines, since recognised as the general and definite solution of the problem, was kept back by the prohibition to import vines in regions not then contaminated. M. Gustav Foex (Inspector-General of Viticulture, France) had stated that the use of cuttings of American vines without heel could have been authorised, under supervision, without incurring any danger. In that way, he continued, reconstitution would have been more rapid, and they would have avoided the period of great decrease in their production.

### THE RISK OF FUNGUS DISEASES.

Another of the contentions of those opposed to the introduction of American stock was that there was the risk of introducing certain fungus diseases, chief of which were the downy mildew and the less-destructive black rot, hitherto unknown in Australia. Downy mildew was last year recorded for the first time as appearing in Victoria. The outbreak did not appear to have been a serious one, and fears for its recurrence, except under similar unusual conditions of humidity, were not entertained. Californian experience justified the belief that South Australia's summer conditions were sufficiently dry to prevent the more serious fungus diseases establishing themselves.

### THE CASE OF SWITZERLAND.

Switzerland had been quoted as an example of a country in which methods of extinction had been successfully adopted; it would be quite a mistake to infer from that that Swiss viticultural conditions to-day were analogous to those of South Australia. The Swiss Government sanctioned the reconstitution of vineyards with American stocks in 1896, in consequence, it was alleged, of the very limited success of the costly annual treatments involved in the attempts at extinction of the phylloxera. But a Swiss State Nursery of American vines was established as far back as 1889, and a French writer could say, in 1899—"There are now State nurseries for the propagation of American stock in almost every canton."

Mr. Taylor then quoted at length from Mr. de Castella's second progress report on viticulture in Europe, as a fairly recent and authoritative statement of the Swiss position, and also from a report by the State Viticulturist for South Australia (Mr. H. E. Laffer) of a "Phylloxera investigation" made at Rutherglen two years ago. (*Journal of Agriculture*, 1915.)

At the conclusion of the paper, Mr. Taylor moved—"That this Conference recommends to the serious and sympathetic consideration of the Phylloxera Board the establishment of a nursery of phylloxera-resistant vinestocks for the future use of South Australian vinegrowers." (The full text of Mr. Taylor's paper has been published by him in pamphlet form, and may be had on application to him at Renmark).

Mr. A. E. Ross seconded the motion *pro forma,* but he thought the Conference ought to hear Professor Perkins on the subject before they did anything in the matter.

### THE DIRECTOR OF AGRICULTURE'S OPINION.

Professor Perkins, who, on rising to speak, was received with applause, said that he congratulated Mr. Taylor on the preparation of his paper. He had in past years given that question a deal of thought, but had not had to deal with it much of late years. He still, however, adhered to the previous conclusions he had arrived at. He had listened to arguments similar to those of Mr. Taylor for the last 20 years, and he still held there was no reason for altering their practice in South Australia.

### THE DANGER POINT.

There was no danger, he thought, of an outbreak of the disease on the river settlements, and until the disease broke out at Mildura he did not think they need have much concern. If there was a danger at all it would be in the smaller vineyards round about Adelaide, which were in communication with outside districts. Had Mr. Taylor adhered to his original resolution, it would have been asking the Board to do something for the benefit of the river settlements alone, and to do that would have been of little use to the rest of the State. In his opinion, the Board could not use its funds for a special purpose or a special district; but the widening of the resolution had done away with that objection. Mr. Taylor had dealt historically with Mildura, and had quoted from Mr. Dubois's letter to show that vines should be grafted on American stocks. But in Mildura there had been no resorting to that idea. In France the introduction of American vines had doubled the expenses of the grower, and so one could not expect growers to adopt the practice except under compulsion, and the result would be that in South Australia there would be no one who would differ from the Mildura precedent. Indeed, they would be the first country in the world, if they did this, to bring in the cure before the disease was present. There was a strong reason why American vines should not be brought to a clean country or a clean district. Mr. Taylor's argument might suit the individual, but what of the others? An enthusiast might adopt the idea, and have half his vines on American stocks, but the Board could not be expected to spend its funds for the benefit of individuals. Suppose the disease appeared locally, and a grower had half his vines grafted on American stocks. He would still have the phylloxera, and what would they do? Would they destroy the vines because they had the disease? They would not destroy them because they were going back, but because they would be a source of danger to the other growers. It was pointed out by Mr. Taylor that one had to examine the roots of the American vine to discover whether they had the disease or not. Then what was the use of the American vines to the growers? They would have to be destroyed in any case. He added that American vines could be grown from seed if the growers desired to do so.

## Downy Mildew.

Professor Perkins went on to say that steps had been taken in Victoria to isolate Mildura from the outside districts, and this was a refutation of Mr. Taylor's argument in regard to the absence of downy mildew in Mildura. But Mr. Taylor had to admit that an outbreak of downy mildew had occurred in Victoria, though he made light of the fact; but there were quite enough summer rains in some of their districts to render downy mildew a troublesome disease to growers, and they would have to spray with Bordeaux mixture two, three, or four times a year. It was a very serious disease, as it might destroy a crop late in the season. He had seen vineyards where there was not a leaf left on the vines, and he might add that the disease spreads like a fire. Downy mildew had broken out, and they would have it again, and it would cause increased expenditure. Mr. Taylor had said that black rot was not so dangerous a disease. As a fact it was more dangerous, in that it attacked the fruit, and was not easily controlled. There were quotations of another kind made by Mr. Taylor from others in regard to checking the disease. But if they analysed these opinions, they would see that they referred to districts where they already had phylloxera. They had to bear in mind that no one was infallible, and he would be sorry to be one to agree to the admission of American vines into the State. They had to remember that if they could sterilize vines the work was in the hands of men, and men were not infallible. Mr. Taylor had quoted from Mr. Viala, of whom he (Professor Perkins) had been a pupil; but his remarks were applied to a country under different conditions from those of South Australia. He had himself visited Tunis, where phylloxera had recently occurred, and there they were not introducing American vines, but were dealing with the disease under European conditions. Their own vines represented a million pounds, and it was a question of whether that was worth saving or not. Mr. Taylor had quoted Rutherglen, where they had introduced American vines, and the place had been ruined. As a fact they had in Victoria kept back phylloxera for 25, not 15, years, as stated by Mr. Taylor, and in Rutherglen they had, when the phylloxera occurred, ceased their checking efforts, and had introduced the American vines. His argument against the Victorian Government was that their efforts had been puerile and ineffective. But in South Australia, with their isolated vineyards—so different from Europe—they could combat the disease. If the disease occurred in Waikerie to-morrow he did not think that in the lifetime of any of those present it would be necessary to introduce American vines. Mr. Taylor had instanced the high cost of eradication methods, reaching, he stated, up to £300 per acre treated in New South Wales. But what of that? Suppose in the course of 20 years they spent £5,000 per annum in destroying 100 acres of phylloxera invaded vines. That would represent a total of £100,000, or £1,000 per acre. Now, what was £5,000 relatively to the capital value of South Australian vineyards? They had about 30,000 acres, which in the aggregate should in his opinion have a value of about £1,000,000, and £5,000 was only ½ per cent. on that sum. He was not inferring that they should necessarily spend £5,000 a year in combating the phylloxera. He merely wished to emphasize the fact that cost per acre as indicated by Mr. Taylor was no argument against the wisdom of fighting the phylloxera whenever it appeared. He complimented Mr. Taylor on the case he had made out, but, personally, he could not subscribe to it, and he would add that, from the point of view of the State, there was nothing to be gained by its adoption.

Mr. Taylor, in reply, said that he had taken the matter up for the Renmark Branch of the Bureau. Professor Perkins had placed his finger on the weak spot when he referred to the outbreak of downy mildew. He could not, nor could any of the members, decide what should be done from the point of view of Professor Perkins. He had quoted from numerous experts, and there he had to leave it. But he argued that what they wanted was to have at hand stocks ready to plant if the disease did break out, as was the case in Switzerland.

Professor Perkins—But not until after they had kept it in check for 40 years. We have not got the disease here.

Mr. Taylor—But I take it your argument is that we should not import American vines even after we have the disease?

Professor Perkins—That is so.

In reply to a question, Professor Perkins said that phylloxera first broke out in Victoria in Geelong in 1873. The disease did not live in the ground after the vine was destroyed; but he would instance cases where they thought the vines had been destroyed, but men had had to go over the ground with ploughs afterwards because it was found the vines were again springing up. He was against the suggestion of Mr. Laffer to establish a nursery on Kangaroo Island, as, though the place was isolated, there was always the danger of persons bringing the disease over. He held that it would be time enough to talk about the nursery when the disease came here. Why the growers were thinking that local nurserymen could not produce sufficient rooted vines he could not understand. Private enterprise was doing the work in other countries, and he thought they would rise to the occasion in this State.

Mr. Quinn said that as a member of the Phylloxera Board he had occasion to follow the question closely. The value of the repressive measures that had been taken in Victoria was nil. He had seen kerosine poured over the vines in Goulbourn Valley under Government supervision, and was assured, in not very good English, that "the kerosine would go right down to ze roots of ze vine." Mr. Quinn instanced several cases of gross carelessness in Victoria. There had been no check on the distribution of vines from one part of Victoria to another after the outbreak in Geelong. In regard to the suggested nursery, he pointed out that they could not get all sorts of soils and climates in any one district, and to carry out the idea of Mr. Taylor for an instant replanting they would have to have experimental vineyards in every district.

Mr. Taylor—That is so.

Mr. Quinn said that Victoria said they could not get sufficient grafting wood, but he was sure that they could quickly establish a mother vineyard, and in view of the slow growth of the disease, they would have ample time to cope with it.

Mr. Taylor, in conclusion, said that in fairness to Professor Perkins he ought to say that in California Professor Wickson now said that it was doubtful whether it was advisable to use resistant stock until they actually had the disease.

On the motion being put it was declared lost.

The flesh of a sow killed in heat is not likely to cure well, as the constitutional upset is somewhat similar to fever, and therefore the flesh is likely to be soft and not set, says Mr. Place. It is an easy matter to evade killing at that time, as the symptoms of heat in a sow are distinct.

# DOWNY MILDEW IN VINES.

## RECONSTITUTION IN NEW SOUTH WALES.

A Report by the Viticultural Instructor and Lecturer (Mr. H. E. Laffer).

For the first time in Australia the disease known as downy mildew of the vine (*Plasmopara viticola*) has been identified in the vineyards of Victoria.

The infected area is situated in the north-eastern portion of the State comprising the Rutherglen and adjoining shires bordering on the River Murray at Wahgunyah, and the fungus has been discovered during the past season on a strip of country roughly 400 square miles in extent. This points to the fact that the outbreak is not the result of one year's infection, but rather that it has been present in the incipient stages for at least several years.

Climatic conditions prevailing up to the 1916-17 season have been of such a nature as to check the disease before the development of conidiophores could take place, and therefore reveal the nature of the trouble. In all probability there has been for several years a slight development upon the leaves of the vines, but not sufficiently marked to attract special attention.

The past season, owing to the prevailing weather conditions with frequent summer rains, enabled a further development of the fungus to take place, and the characteristic sporulation on the under surface of the leaves left little doubt as to its origin. To be perfectly sure, however, specimens were submitted by Mr. Castella (Government Viticulturist of Victoria) for pathological examination, and his diagnosis was subsequently confirmed by the micro-biologists.

Although the importation of this disease into Australia is to be regretted, it was in a sense only to be expected that sooner or later it would appear. Victoria and New South Wales have imported large numbers of grafted phylloxera-resistant vines from Europe within the past 10 years, and the disinfection that would effectively sterilise them of all resting spores of fungoid diseases would necessarily be next to impossible.

Although it is by no means definitely established that the present outbreak can be traced to these vines, yet it would appear only reasonable to suppose that such is the case. The alternative supposition, that the spores were introduced upon imported raisins, is but a remote possibility.

As already stated, the infection is spread over a large area, but so far as Victoria and South Australia are concerned, I am inclined to think that the outbreak need not be viewed with any great feelings of disquietude. Climatic conditions prevailing during our summer in the great majority of seasons will prove an effective check on any serious development; but at the same time it would be foolish to overlook the serious possibilities attaching to an outbreak of the disease even in South Australia.

I do not propose in this report to deal with the complicated life history of this particular fungus, but it may be briefly stated that the presence of free moisture upon the foliage of the vines is absolutely essential to the development of the spores, and also that moist humid conditions are demanded before sporulation by conidiophores can take place.

It is many years, until the present, since the States of Victoria, New South Wales, and South Australia have experienced a season so favorable to the development of cryptogamic pests, particularly downy mildew and anthracnose (black spot). Further, it may be just as many before we again see conditions equally suited to their growth.

If then, as has proved to be the case, downy mildew has not been sufficiently severe to do any appreciable harm under existing conditions it may be taken as granted that in normal seasons its effects will be almost negligible. Indeed such has been the experience of North Africa, where climatic conditions are somewhat similar to our own.

### An Important Aspect.

There is one aspect of the trouble which must however be taken into consideration. Although the disease has without doubt been present for some years in Victoria, never before has there been the development of the myriads of spores such as will be released in the present autumn. These spores are capable of transit over great distances through the agency of the wind, and will provide the means of a more intense infection of the young growth next spring.

The present development came somewhat late in the season, attacking fairly mature growth, and at the same time missing the most fatal aspect of the whole course of the disease, namely, the attack upon the fruit. It remains to be seen whether in the early stages of growth next year there is going to be any serious attack upon the young foliage. If such is the case, then it is possible that the injury done to the young growth will be reflected upon the vigor of the vines in general, and possibly some hold may be obtained upon the fruit bunches.

This, of course, presupposes that no preventive action is taken; but it is safe to assume that growers within the infected areas will adopt all recognised means of preventing the development of the spores upon the young growth of the vines. Timely treatment with effective fungicides, coupled with adverse climatic conditions, should in a measure minimise the danger arising from what represents one of the most destructive diseases affecting the vine in Europe.

During my visit to Rutherglen, in company with Mr. Castella, I had the opportunity of viewing downy mildew in a number of vineyards, the principal of which being the Viticultural Nursery, Messrs. Ireland's and D. Smith's at Wahgunyah, the Viticultural College, and Mount Ophir. The disease was discernible almost everywhere, but the amount of sporulation was not very great. It was remarkable to observe how the proximity of even small sheets of water, such as a dam or drain, influenced the development of conidiophores. Frequently not observable in other parts of a vineyard, it was always to be found under the conditions referred to. Naturally the worst infection was in the near vicinity of the River Murray or its back waters; and at the State Nursery, where considerable irrigation is carried on, it was particularly noticable.

This fact raises the question as to what damage might be done within the Murray Irrigation Settlements; but I am inclined to think that even with intense irrigation, the atmospheric condition of these areas is too dry to cause any uneasiness.

So far as I was able to ascertain, there has been so far no development of the disease outside Victoria or beyond the area referred to. The nearest vine district to it is Corowa, in New South Wales, immediately across the river from Wahgunyah, and this might reasonably be expected to show signs of its presence within a short time. Further along, in the Albury district, there are no indications of downy mildew having put in an appearance. These districts, like the north of Victoria, are too dry for the fungus to do any great amount of harm in ordinary seasons.

It may be considered rather remarkable that downy mildew has not been discovered in New South Wales, for within recent years considerable numbers of vines have been importd from France for the purpose of replanting vineyards destroyed by phylloxera. Possibly it may be due to the fact that spraying of the young vines has been attended to with a view to preventing any possible outbreak of fungoid disease.

Under the guidance of the Viticultural Department of Victoria the specified treatment for downy mildew has been, and will continue to be adopted, and we may safely assume that the disease will be held in check by these remedies and adverse climatic conditions. The spray being used is the 6-4-30 formula of Bordeaux mixture. Every effort will, of course, be made to check the spread of the fungus by other than natural agencies, and against these we have no control.

The presence of downy mildew in Australia is a matter to be regretted, even assuming that it does but little harm under our normal conditions of summer temperature. In any case it will necessitate constant watch and the application of spray mixtures to keep it from developing in the localities where it has been observed. At a rough estimate it may be taken that the cost of treating vines will not be less than £1 per acre, representing a considerable increase in the cost of maintaining a vineyard.

It serves to demonstrate the danger resulting from the wholesale importation of foreign vines, and at the same time affords an object lesson of which South Australia might take advantage.

### RESERVES OF AMERICAN STOCKS.

I have in the past advocated the establishment of reserves of the American species of vine, which have proved themselves of value as stocks to the vinifera. Such reserves could be established in a quarantine area such as Kangaroo Island, the necessary cuttings to be obtained from one or other of the clean districts of Victoria or New South Wales, of which there are several free from the disease.

It is freely conceded that the risk of introducing phylloxera upon ripe vine cuttings is very remote, and given proper sterilisation, that risk should be completely eliminated.

The fact that the problem is now further complicated by the presence of downy mildew within Australia, in my opinion, makes it even more imperative that a start should be made from clean stocks.

It is scarcely reasonable to suppose that South Australia is never going to have phylloxera in its vineyards, nor is our experience with regard to its extermination going to be different from that of every other vine-growing country which has been attacked by it.

If the matter is delayed until we discover that South Australian vineyards are phylloxerated, then there will be immediate necessity for introducing resistant vines in large numbers from either Europe or the Eastern States. In all probability the latter would not be in a position to supply the vines, and they would have to be drawn from Europe, risking the almost certain introduction of other pests as well as obtaining inferior results in the percentage of growths.

At the present time, cuttings of all the main resistant species can be procured from Victoria, where some districts, such as Mildura, are still free from both phylloxera and mildew. It is a reasonable possibility to sterilise cuttings even from the latter, but it may be said to be impossible to effectively sterilise large numbers of rooted vines.

As South Australia is one of the few States which has so far not suffered from phylloxera, so it is one which has the opportunity of initiating a policy which will enable us to avoid the mistakes made by other countries. Other countries have had their vineyards destroyed before any effectve work in reconstitution has been done, mainly because lack of information on the subject has prevented a thorough grasp of the situation.

With all the experience of other countries in the matter of stocks, South Australia should be prepared to start replanting as soon as existing vineyards begin to die out. The area under production then can be maintained and stocks of wine kept somewhere near normal. The greatest danger arising, apart from the destruction of vineyards, is the question of allowing the cellars to become empty, resulting in the dislocation of local and the probable loss of the export trade.

### Vine Propagation in New South Wales.

After completing my observations of downy mildew in Victoria I passed on to New South Wales with the object of looking into the matter of vine propagation in that State. Before proceeding to Sydney I went across, *via* Wangaratta, to Albury, and while there took the opportunity of meeting Mr. Geo. Frere, one of the leading vinegrowers of the district. Mr. Frere has in the past carried out some very interesting work in connection with the green manuring of vines, to which I was able to refer in a paper on the subject of "Vine Manuring," delivered before the Agricultural Bureau Congress held in Adelaide in 1913. Unfortunately since that time, this vineyard, as well as most of the others in the locality, have been destroyed by phylloxera.

From information gathered, the destruction of the vines was particularly rapid from the time of the first indications of disease were apparent. The first manifestation of the presence of phylloxera was in 1913, and it was assumed that, in all probability, at least five years of production remained to the vines. In the meantime reconstitution would be proceeded with as fast as possible. This assumption proved wrong, however, for the effects of the disease, coupled with the dry conditions of 1914, completely finished the old vines. I had opportunity of inspecting the reconstituted vineyard, and was agreeably surprised to note the excellent percentage of vines growing in both the 1915 and 1916 planting. I should say that at a safe estimate it could be put down as not less than 90 per cent., and it evidenced the advantage to be gained by paying every attention to the planting of the vines.

My main object in New South Wales was to visit the Viticultural Station at Narrara, where good work is being done by the Manager, Mr. D. Jenkins, in connection with the propagation of resistant vines.

This nursery is of special interest because it is worked upon lines opposite to those practised at Wahgunyah, in Victoria, and it has given rise to a good deal of conjecture as to which system is right. I was therefore anxious to see and to form my own conclusions on the matter. The opinion which I formed is that both are right in their own particular location, it being simply a matter of difference of climatic conditions. In Victoria the work has to be carried out and the grafts joined or calloused by the aid of artificial heat. At Narrara, on the other hand, the necessary temperatures are obtained under conditions of Nature, and it would, therefore, appear unnecessary to adopt measures for creating artificial heat.

The lowest soil temperature recorded during the winter has been 65 degrees F., or a few degrees below an ideal callousing temperature for grafting. In spring heat and moisture are such as to secure a rapid union of the graft and an excellent growth of the vine. The grafts are made in the usual way, using a slightly longer section than is the case in Victoria and tying with a little raffia to prevent any disconnection when planting. This tying takes a little extra time, but is necessary under the circumstances. It is, however, compensated for by saving of time and labor involved in artificial callousing.

From the grafting sheds the cuttings are planted direct into the nursery beds, where the earth is well mounded up to cover the union of stock and scion in order to prevent evaporation and death. At regular intervals throughout the season scion roots are suppressed, and in the autumn the grafts are exposed in order to harden them.

Up to the present the Narrara nursery has been worked only on a comparatively small scale. Shortage of resistant wood has been the trouble in the past, but supplies are now becoming more plentiful, so that the number of vines grown can be very considerably increased in the future.

### THE "YEMA" BUD GRAFTS.

As experience of propagation is gained variations of accepted rules are being introduced. One of the principal of these is the so-called "Yema" bud graft. Its use is very applicable to field grafting, and it requires no particular skill to achieve a large measure of success. It is becoming increasingly popular in Victoria, and most excellent results are obtained. A somewhat modified form of the original is used, and with care very high percentages of growth are obtained. It appears to be safer than ordinary field grafting, and it has this advantage, that if the buds fail the vines can afterwards be grafted by ordinary field methods in the spring. The probability is that in the future more resistant rootlings will be planted into the vineyards and afterwards "Yema" budded in the succeeding autumn. There is always a considerable quantity of resistant wood too small for bench grafting, and which is struck in the nursery for subsequent field grafting. With the advent of better knowledge and simplified grafting methods these rootlings are readily sought after. I was struck with one adaptation of the "Yema" bud being experimented with by Mr. Jenkins at Narrara. It consists in putting buds into the annual canes of resistant varieties at intervals of about 15in., and covering them with earth to assist callousing. According to the length of the canes, some four to eight buds were placed in each, and in the coming winter these will be cut into sections and planted into the nursery beds. Under Narrara conditions the buds had taken splendidly, and it would appear that the advantage lies in the fact that a lot of work can be done at what is a fairly slack time in the nursery, and should materially assist the number of vines put out in one season. It will be interesting to note the result of the work already done when the cuttings are growing next season in the nursery. As a secondary means of propagation, the idea should have a good deal to recommend its adoption under conditions prevailing at the Narrara Viticultural Station.

I was considerably impressed with the possibilities of this locality for propagation, the one additional facility necessary to complete success being a supply of water for irrigation in time of scarcity. This however, should not be difficult to supply under the natural facilities at hand. Even without irrigation the summer rains natural to the locality have caused an excellent growth in the young vines.

Before leaving New South Wales I had the pleasure of spending a day in visiting Minchinbury Vineyards at Rooty Hill, where by the courtesy of the Manager (Mr. L. Buring), who is an old student of Roseworthy, I had the opportunity of inspecting the vineyard and cellars, also of tasting a number of wines of all ages. Mr. Buring is an enthusiast in his work, and has placed the Minchinbury wines on a high plane.

The whole of these vineyards have been reconstituted with vines imported from France, and, speaking generally, they appear to be doing well. As already stated, there has been no evidence of the presence of downy mildew in the vines.

Apart from Narrara, the New South Wales Department has another propagating nursery at Mirool, upon the Yanco Irrigation Area, where the work is carried out more upon the Victorian lines, climatic conditions rendering such necessary. Time would not permit of my gong to see this station, however, nor was there any particular advantage to be gained, because in the event of the necessity arising for the establishment of propagation areas in South Australia I am of the opinion that we should have to work along the Victorian lines, using artificial heat for callousing and also to adopt a good deal of field grafting. The propagation of resistant vines is not by any means a simple matter even when all the facilities are to hand, and when it is complicated by a scarcity of resistant wood the problem becomes even more complex. This has to a large extent been the trouble in both Victoria and New South Wales, and I merely reiterate it in the hope that South Australia will not, in the time of need, be in a similar plight.

In closing this report I would express to the Departments in Victoria and New South Wales my sincere thanks for the courtesy extended to me, and particularly to Mr. F. de Castella and to Mr. Jenkins for the information they unstintingly gave me.

The Director of Agriculture (Professor Arthur J. Perkins), in commenting on the report published above, says:—

"Mr. Laffer's arguments in favor of introducing American vines into South Australia are hardly convincing; and whilst I have no intention of opening up the whole question, it would, perhaps, be unwise to let some of his remarks pass without comment.

"Mr. Laffer asserts that 'other countries have had their vineyards destroyed before any effective work in reconstruction has been done, mainly because lack of information on the subject has prevented a thorough grasp of the situation.' He wishes us to infer that had these countries known as much about the phylloxera as is known to-day they would have proceeded replanting on American vines as soon as the pest was discovered in their midst; which, indeed, is the practice he advocates for South Australia.

"Mr. Laffer, and those who think with him, will have to admit that as yet no country in the world has been foolish enough to introduce American vines in anticipation of the phylloxera, and this, curiously enough—the introduction of the cure before the disease—is what we are asked to do. And whilst Mr. Laffer is perfectly correct in the statement that other countries have not fallen back on American vines until their vineyards had been more or less destroyed by the phylloxera, he is, I think, taking a good deal for granted when he infers that had they known more about the subject they would have acted otherwise. Let me point out to him that as much was known in France about the phylloxera and American vines in the early nineties as is known at the present time; and whilst it might be argued that such knowledge had not yet spread to other countries, this argument cannot hold good for countries such as Algeria and Tunis, French colonies in daily contact with the views and ideals of the mother country. And yet, curiously enough, neither of these countries followed the policy which Mr. Laffer finds so logical. Mr. Viala himself, who is often quoted on this subject, advised Algerian vinegrowers to have nothing to do with American vines until they could not do otherwise. I was in Tunis in 1910, and found that country to have been recently invaded by the phylloxera; but there was no thought of introducing American vines. Every effort, on the other hand, was being taken towards protecting clean vineyards.

"Mr. Laffer's contention that replanting of American vines as soon as existing vines begin to die out will have the effect of maintaining production normal, seems to me altogether untenable. In the first place, it would represent the simplest means of spreading the pest all over the State in the shortest possible time. Although the phylloxera had been discovered in Victoria in the early seventies, it was not until the beginning of this century that the pest spread to any extent; and then only when the Victorians gave up any further attempt to check it and fell back on American vines. We are asked to take our medicine in one gulp; but, after all, are not 30,000 acres of vines worth defending for 20 or 30 years; or are we to allow them to be destroyed in four or five years?

"Those who insisted on importing American vines into Australia were warned of the danger of importing diseases as well; the idea was scoffed at. Downy mildew has already been introduced, and there are many others to come yet, all of which will tend to render vinegrowing more costly and less remunerative.

"There are times when 'let well alone' is good policy."

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# GRAIN WEEVILS.

## A MENACE TO THE WHEAT STACKS.

The possibility of weevil taking a heavier toll of our wheat than that taken by mice will be unwelcome news to wheatgrowers, but it is reassuring to notice that the Commonwealth Advisory Council of Science and Industry has already taken steps to inquire into the matter, with a view to devising means to prevent such losses.

The first progress report of the Special Committee, which has just been issued, deals only with the grain weevils (*Calandra granaria* and *C. oryzae*), as these are the only insects attacking stored grain whose destructive effects are serious enough to demand special measures. The following extracts from the report are published:—

### The Development of Weevil in Wheat and the Increase in Number of Weevils.

The wheat when bagged in the paddock has no weevil in it. It must come in contact with weevils after that before it becomes infested. This may happen in many ways. (1) Placing the grain in old bags which have been weevil infested, or in store sheds or granaries where there are weevil. (2) Weevils flying from grain stores, feed houses, &c., and working their way into the bags and sacks. (3) Using material in the construction of the foundations or the protection of the wheat stacks—wood, sleepers, old bagging, &c. (4) Bringing bags of weevil-infested wheat in contact with or stacking near the sound wheat. There must be a female weevil to lay her eggs in a grain of wheat before that grain of wheat is weevil infested. To the naked eye the grains may appear perfectly sound, as the minute hole into which the egg is inserted in the grain does not show. It is when the egg has developed through the maggot, pupa, and perfect insect, and the latter has gnawed a hole through the side of the wheat grain, that the damage to the grain is evident. Not only do the weevils live and breed through their life cycle in the grains of wheat, but the perfect male and female weevils feed upon grain themselves, so that the damage is increasing all the time.

The life history from the egg to the adult beetle varies from 19 to 22 days in a warm suitable temperature. In three months 40 weevils multiplied themselves 60 times and counted out 3,056 weevils.

## DESTRUCTION OF WEEVILS BY MEANS OF POISONOUS GASES.

The various methods of treatment by poisonous gases which have been tried either on an experimental or a large scale for the destruction of insect pests in grain are not applicable to bagged grain, save at a prohibitive cost.

In regard to fumigation with carbon bisulphide, 1,000bush. of grain require 10lbs. of carbon bisulphide, and require to be enclosed for 24 hours, with a temperature of 70deg. and not under 60deg. In badly infested wheat a second fumigation is required to get rid of the eggs and weevil inside grain about three weeks later. The cost of bisulphide is 7d. per lb., war rate.

Experiments were conducted with hydrocyanic gas under similar conditions and temperature, and it was proved to be not satisfactory even with 48 hours.

Fumigation with carbon dioxide is the most effective; 14.35 cub. ft. of gas will submerge 1 ton of grain, and can be forced in at the bottom of the wheat or airtight silo. One pound, at atmospheric pressure, occupies a volume of 9 cub. ft., and would cost 3d. per lb. in large quantities. The total cost would be 4¾d. per ton, and the gas could be used over and over again. Carbon dioxide runs to waste in distilleries.

## DESTRUCTION BY MEANS OF DRYING.

Wheat from thrashers averages 6.7 per cent. to 7.2 per cent. moisture. When dried in the sun this is reduced to 4.7 per cent. In 4.7 per cent. and 6.7 per cent. of moisture the weevil did not breed. With 8 per cent. moisture the weevils died in six weeks without breeding. With 9 per cent. of moisture the weevils were dormant, and did not breed, but when more moisture was added they became active and bred. With 10 per cent. of moisture the weevils bred, but required free air in order to breed with normal rapidity. Drying the wheat artificially or in the sun, and then storing in air-tight bins is sufficient to prevent weevil from attacking it. If weevily wheat is held under the same conditions the weevils die off. Moisture and a temperature of 80deg. F. without moisture is fatal. Deprived of oxygen all weevils die within seven days.

Certain of the above-described methods are employed in breweries and flour mills for ridding grain of weevils; but it is to be noted that in such cases the grain is treated in bulk and has not to be rebagged. Destruction by such measures of the weevils and their eggs, when they have once seriously invaded the grain, being in the case of bagged wheat extremly costly, it is very important to inquire if there are any means of preventing such an invasion from taking place.

One obvious set of precautionary measures consists of measures for preventing weevil from gaining access to the grain. As has been already pointed out, wheat has no weevil in it when in the field. (This does not hold good of maize.) In order that weevil may not gain access to it during carriage and storage, it must not be packed in old bags which have become already tenanted by weevils, and it must be stored in such a way that weevils will not be able to reach it. Such precautions are difficult to carry out effectively in practice.

The grain weevils are widely distributed, and are very tenacious of life. Moreover, as already mentioned, a very small number gaining access to stored grain are able, *if conditions are favorable,* to multiply enormously in a comparatively short time.

### FAVORABLE AND UNFAVORABLE CONDITIONS.

A study of the conditions most favorable to the multiplication of grain weevils shows at once that temperature and moisture have to be considered before anything else. Both of these are, of course, capable of being controlled.

The experiments of F. J. Cole, Maxwell Lefroy, and others have shown that the presence of a certain degree of moisture in the grain is essential to the active multiplication of the weevils. This essential percentage of moisture is a high one (10 per cent.), and when wheat is first bagged, under ordinary circumstances, it does not contain nearly sufficient moisture to enable any weevils, however freely they may gain access to it, to increase and multiply.

Unless moisture is actually added from without the grain remains weevil proof. Thus if stored in a fairly dry climate, and completely protected from the weather and from the absorption of moisture from the soil, it is perfectly certain that the grain may be stored indefinitely without danger from weevil.

The problem of the storage of grain in large quantities for more than a few months has never had to be met in Australia until within the last few years. The prevailing methods of transport and of storage appear to be extremely crude and wasteful, and, what is to the present purpose very favorable to the development of weevils. This (the presence of conditions favorable to the grain weevils) holds good more especially of the grain stored on the seaboard. There, even if the protection from the rain water were complete, there is reason to believe that with the moist air freely penetrating the mass of stored bags, the moisture absorbed, even with grain arriving dry, may soon reach the point which favors the rapid multiplication of the pest. But, unfortunately, this moistening of the grain is greatly accelerated by the prevailing methods of storage, which do not by any means afford complete protection from heavy rains.

# OFFICINAL PLANTS.

The following information has been supplied by Professor T. G. B. Osborn, M.Sc., to whom a request by a correspondent for a list of plants of medicinal value growing in South Australia, and the purposes for which they were of value, was referred: —

I find that very few officinal plants grow native in South Australia, or indeed in Australia at all. The XIX. edition of "Squire's Companion to the Pharmacopœia" (1916), gives the following for Australia:—

*Acacia decurrens*—Bark, for tannin.

*Alstonia constricta*—Bark, aqueous extract for bitter principle.

*Eucalyptus globulus* and other spp.—Leaves, oil. *E. globulus* and *amygdalina* (the latter only being native of the South-East of this State) were formerly the two officinal species. In practice many species are distilled in South Australia, notably *E. cneorifolia,* found on Kangaroo Island and Eyre's Peninsula, as well as several of the mallees.

*Eucalyptus calophylla* (Western Australian species)—For kino. Very possibly the kinos of other species are used. Astringents.

*Mallotus Philippensis* gives the drug kamala. The plant is more or less pan-tropical.

It will be seen that of the above short list only the eucalypts are native of South Australia. A possible exception is *Acacia decurrens*, which is really an eastern Australian species, but which occurs in the extreme South-East of the State.

I know of no reliable account of any other native drug plants that may have local value, except that by Maiden, in the "Useful Native Plants of Australia." But few of the list given by him are South Australian plants. However, the following are:—

*Adiantum aethiopicum* (maidenhair fern)—Slightly astringent and emetic.

*Codonocarpus cotinifolius* (quinine tree, medicine tree, horseradish tree)—Bitter principle, but quite different from quinine.

*Cymbonotus Lawsonianus*—Extract of leaves, with lard, used as a salve.

*Duboisia Hopwoodii*—The natives' pituri, used for chewing, has an intoxicating effect.

*Epilobium tetragonum* (native willow herb)—Diuretic.

*Erythraea australis* (native pink centaury)—Infusion used as tonic in the same way that its relative *Erythraea centaurium* is in Europe.

*Hardenbergia* (*Kennedia*) *monophylla* (native lilac)—Used as sarsaparilla. Maiden says the virtues are imaginary. I have been told that the common dune climber *Muehlenbeckia adpressa* was used for this purpose by early settlers on the South Australian coast.

*Hydrocotyle asiatica*—Used in India for skin diseases.

*Justicia procumbens*—Used in India for ophthalmia.

*Melaleuca uncinala* (tea tree)—Leaves chewed for catarrh.

*Mentha gracilis* (native pennyroyal)—Regulating menses.

*M. saturcioides*—Regulating menses.

*Mesembryanthemum aequilaterale* (pig face)—Astringent properties

*Myriogyne minuta*, syns. *Centipedia orbicularis and Cunninghami*—Ophthalmic.

*Portulacca oleracea*—Antiscorbutic. The introduced *Eruca sativa* also has this property.

*Pteridium aquilinum* (bracken).—The European fern is used as a vermifuge.

*Sarcostemma australe*—Milky juice used on wounds.

*Sebaea ovata*—See *Erythraea* above, to which it is related.

*Typha augustifolia* (bul-rush)—Root stock used in Eastern Asia in dysentery, gonorrhoea, and measles.

It is rather to be regretted that we have not more on record of the uses of "simples" by early colonists. Settlement, with its attendant cultivation, is destroying many of the above plants, though some few of them, *e.g.*, *Erythraea* and *Portulacca*, are likely to survive. Even in Europe the herbalist's is a dying profession, and it is hardly likely to develop in a new country with no wealth of tradition behind it.

Of the introduced plants of medicinal value some mention might be made. Apart from cereals, the following grow in profusion:—

*Prunus amygdalus* (almond)—Oil from seeds.

*Pyrus cydonia* (quince)—Mucilage from seeds.

*Olea europaea* (olive)—Oil from fruit.

No doubt some of the local-grown products find their way to the pharmacists, though Australia is not the "official" source.

The following plants, which are naturalised weeds in South Australia, appear in the British Pharmacopœia:—

*Anthemis nobilis* (common chamomile)—Flower heads.

*Conium maculatum* (hemlock)—Full-grown unripe fruits.

*Datura stramonium* (thorn apple)—Dried leaves and ripe seeds.

*Mentha piperita* (peppermint)—Oil distilled from fresh flowering plants.

*M. viridis* (spearmint)—Oil distilled from fresh flowering plants.

*Ricinus communis* (castor oil)—Oil from seeds.

*Rosmarinus officinalis* (rosemary)—Oil distilled from flower tops.

*Taraxacum officinalis* (European dandelion, not the Cape weed, *Cryptostemma calendulaceum,* often called dandelion)—Fresh and dried roots.

The above are all official drug plants. There are, of course, others among our introduced plants of some medicinal value that find their place in books of "simples" and the herbals of European countries. Some of these are possibly of doubtful value, though others may be of real use to a peasantry that is accustomed to their preparation.

# WEEDS ON THE EAST-WEST RAILWAY.

(By H. W. ANDREW, Botanical Assistant and Quarantine Officer of Plants, S.A.)

In January last, Captain S. A. White made a collection of plants from the neighborhood of Ooldea, on the East-West railway, between 400-410 miles almost due west of Port Augusta, which he subsequently submitted to Mr. J. M. Black for identification. The majority of these plants as might be expected, are native, while at least one of them, an Acacia or wattle, has not been previously found—at any rate described. The recording of the names of other plants found in that part of the country will also add to our knowledge of their distribution. However, it is not purposed to deal here with these native plants, as detailed notes concerning them will be compiled by Mr. J. M. Black, and subsequently appear in the Transactions of the Royal Society of South Australia.

A feature of more general interest is the appearance of several introduced plants which have already obtained a footing on the railway there, and which it may reasonably be supposed have followed in the wake of the workers on the railway line. It is remarkable that weeds should have been found so early after the commencement of operations along the railway in the heart of the so-called "desert," and it adds another confirmation to the well-known fact that man directly or indirectly is the greatest distributor of weeds. All of the plants collected have not yet been examined, but at least two are weeds that have well established themselves in a number of the settled districts of the State. The better known of these two weeds is the Hoary Cress (*Lepidium Draba, L.*). In parts of the Strathalbyn district it thickly covers cultivated fields, while at Kapunda and elsewhere it also thrives on roadsides and neglected places. It is a native of Europe, Western Asia, and Africa. Professor Ewart states, "This weed, like so many others, was introduced from Europe with impure agricultural seed and also with ballast and fodder, and is especially troublesome in lucerne paddocks. It is a perennial with deeply penetrating roots, pieces of which will continue to grow. It has clusters of small whitish flowers and small flattened pods with one seed in each cell. It is a prolific seed bearer, and altogether is a difficult plant to eradicate. It would be a great nuisance in orchards. Summer fallowing, deep ploughing, and frequent stirring, followed by root crops, will largely suppress it, but cutting or hoeing, unless often repeated, is of little value, since the new roots contain much stored food, penetrate deeply, and quickly form new shoots. Fortunately, so far it is not abundant outside of the places to which it has been introduced, mainly with impure seed, but it appears to be spreading." The other plant also found at Ooldea, is *Verbena supina,* which may now be seen growing vigorously in the North Park Lands, West Adelaide, and other places. Owing to its prolific seeding and adaptability to various conditions here, it is spreading rapidly in many districts of the State.

In view of the fact that large sums of money are expended annually in the United States of America, the Australian States, and other countries in checking the growth of weeds on railways, because of the danger to property by fire originating from locomotives, and the necessity for ridding the railway ballast of rank vegetation, it should be worth while considering the desirability of taking steps in the near future in the direction of carefully recording the exact distribution of introduced plants along this railway line. Such an examination would probably reveal the presence of other weeds which have reached those parts by way of fodder, packing materials, etc., emanating from the camps established in the course of the construction of the railway. It would also pave the way for early and practicable remedial measures, for it can hardly be imagined any weeds have yet spread beyond very limited bounds. Further, the mapping out of the distribution of possible weed pests while the land along the railway line is in a virgin state would furnish an extremely interesting and valuable basis for subsequent study by botanists and others concerned with the encroachment of introduced plants into the domains of native plants. Such data, at first glance, may appear to have but little practical value, but a considerable amount of work along these lines is being performed in other parts of the world, and not without practical results. Probably few parts of the world offer such advantages over so long a stretch of virgin country.

As the East-West railway runs for the most part through a strip of Federal territory about ¼ mile wide, apparently this is a matter for the Federal authorities. Large sums of money have been spent in this State alone by the railway authorities in burning, cutting, and poisoning weeds, and no doubt the Commonwealth Government would save later on a big sum annually by early preventive action in the direction indicated. The destruction of local patches along the line should be a comparatively easy matter now, and obviate the necessity of ultimately incurring great expense. Though a number of weeds grow more vigorously in wet districts, the majority will thrive where cultivated plants will not, and it would be dangerous to assume that they would not spread in the "desert," particularly in the light of the fact that many of our so-called deserts have been found on better acquaintance to prove good wheat growing and pastoral country.

In addition to the plants collected by Captain White, a number of seeds and fruits obtained from the stomachs of birds during the same expedition were preserved and since submitted to me for identification. The results of investigations concerning these seeds, together with a series of other collections made from many parts of Australia, particularly South Australia, will be compiled and afterwards published. The results furnish convincing proof of the large part played by the birds in destroying enormous quantities of various seeds, as well as in distributing other seeds which they are unable to digest.

## CONCRETE FENCING POSTS.

The difficulty experienced in some districts in obtaining timber suitable for fencing has naturally tended to direct attention to possible substitutes. Amongst these, reinforced concrete has received a measure of notice, and in reply to a correspondent who sought advice as to the best method of manufacturing concrete fencing posts, the Field Engineer of the Department of Agriculture (Mr. J. Paull) recommended making a mixture of cement concrete composed of 4 parts ¾in. and ½in. crushed hard stone in equal parts, 2 parts sand (not too fine), and 1 part cement, mixed as follows:—Mix the sand and cement together dry, spread the gauged quantity of broken metal in a ring, and then wet, and evenly distribute the sand and cement dry mixture over same, then mix thoroughly, using a watering can or hose with a fine rose to damp off to the right consistency. The mixture should be of a mushy consistency, so that it can be compacted by joggling it with a shovel. The tamping that would be necessary with a drier mixture would be likely to spring the forms. and displace the reinforcing.

The reinforcing should consist of steel circular rods, say ¼in. diameter (not less). One of these rods should be placed at each corner about ¾in. from each side. The rods should be bent over at the ends or looped to prevent slipping in the concrete. To avoid sharp edges, which are easily chipped, triangular strips of wood may be placed in the bottom of the mould, along the sides, and when the moulds have been filled and tamped, similar strips may be inserted on top. The moulds, when in place, should be given a coating of soft soap or crude oil, and this coating should be used as often as necessary during the use of the moulds.

In putting the concrete in the moulds a thin layer should be spread evenly on the bottom, and carefully tamped. On top of this layer, when levelled off, two reinforcing rods should be placed in the desired position. The moulds should then be filled and tamped in thin layers to the level of the other two reinforcing rods, the fasteners for fence wires being inserted during the operation. The remaining concrete should be tamped and levelled off, thus completing the post as far as the moulding is concerned. The posts, when removed from the moulds, should be stood under shelter (on end) and kept damp for at least a week, and should not be used until one month old.

As to the cost of concrete posts, it is impossible to say with anything like certainty owing to the varying local conditions, cartage, etc., but they are sure to cost more than wooden posts, except in districts where wood is scarce. Roughly, they should cost about 3s. each for ordinary rectangular posts, say, 7ft. long.

# ADVISORY BOARD OF AGRICULTURE.

The monthly meeting of the Advisory Board of Agriculture was held on Wednesday, June 13th, there being present Messrs. F. Coleman (chair), A. M. Dawkins, J. Miller, T. H. Williams, W. J. Colebatch, G. Jeffrey, G. R. Laffer, M.P., Professor A. J. Perkins, and the Acting Secretary (Mr. H. J. Finnis).

Apologies were received from Messrs. A. W. Shillabeer, C. H. Tuckwell, and Colonel Rowell, C.B.

### STABILITY OF STRYCHNINE IN POISONED ANIMALS.

A report was received from the Director of the Department of Chemistry (Dr. W. A. Hargreaves) dealing with the possibility of the bones of foxes that had been poisoned with strychnine becoming a source of danger to livestock which might chew the carcasses. The report stated:—"When animals are poisoned with strychnine, the poison is absorbed by all parts of the body. It is quickly absorbed by the spinal cord, which appears to have the power of collecting the strychnine from the circulation and storing it up in its structure. When the body of the dead animal is decomposed and dried, the bones, especially the backbone, contain some of the poison. Wynter Blyth, in 'Poisons—Their Effects and Detection,' states—'So far as all evidence goes, strychnine is an extremely stable substance, and no amount of putrescence will destroy it.' McAdam found it in a horse a month after death, and in a duck eight weeks after. Nunneley discovered it in 15 animals 43 days after death, when the bodies were much decomposed; Roger, in a body after five weeks' interment; Richter, in putrid tissues exposed for 11 years to decomposition in open vessels; and, lastly, W. A. Noye, in an exhumed body after it had been buried for 308 days. Strychnine could therefore be retained for a long time in the bones and dried tissue of poisoned foxes. The question whether the bones contain poison in sufficient quantity to poison other animals that may chew them depends entirely upon the quantity of poison consumed by the original victim. It appears to me improbable that a poisonous dose of strychnine would be obtained by this means. I know of no poisons which are so convenient and effective as strychnine and arsenic. Both of these substances may be obtained in the form of powders, or as fine crystals, and baits may be easily prepared from them. Strychnine and arsenic are said to be more effective if used together than if used alone. The arsenic acts as an irritant, and the strychnine as a nerve poison. Arsenic, if anything, is more resistant to decomposition than strychnine, and it may be found in the various organs and in the marrow of an animal that has consumed the arsenic; so that from this point of view there is no gain by using arsenic in place of strychnine." It was decided to thank Dr. Hargreaves for the information. The Chief Inspector of Stock (Mr. T. H. Williams) emphasized the danger of distributing strychnine in a wholesale manner. In his opinion hundreds of cattle in days gone by had been poisoned in South Australia through eating the bones of rabbits that had been destroyed by strychnine. It was significant that, whereas, in certain parts of the north, the so-called dry bible had been a scourge during the time rabbits were extremely numerous and were being poisoned on a large scale, since the rabbits were practically wiped out little, if anything, had been heard of dry bible.

### NURSERY STOCK.

A report was secured from the Horticultural Instructor (Mr. Geo. Quinn) in regard to the wisdom of introducing legislation designed to protect purchasers of nursery stock against the substitution by the sellers of different varieties. The report read:—

"I am of opinion something should be attempted in the direction of formulating a law to regulate the sale of nursery stocks. This is a subject to which I have given considerable thought over a number of years past, as the injustice complained of has frequently come under my notice in country districts, and more particularly amongst non-professional orchardists. Any such legislation must be carefully thought out, so that no injustice may be inflicted upon nurserymen who are attempting to honestly meet their obligations. I do not propose—unless specially requested so to do—to go into a detailed explanation here of the ideas which are taking shape in my mind, but assure the Advisory Board that I am now in touch with the Fruitgrowers' Association, through Mr. G. A. Dunn, M.P., with a view to the matter assuming a tangible form during the coming session of Parliament. As a preliminary, I consider a meeting of selected representatives of the fruitgrowers and the nurserymen should be invited to confer with me to discuss the shape such legislation should take, so as to ensure justice is secured to all of the interests concerned."

Members of the Board realized that there were big difficulties in the way of arriving at a satisfactory solution of the problem, but decided to assure Mr. Quinn that they would heartily support any practical scheme which he might bring forward. Professor Perkins said mistakes would occur in the best regulated nurseries, and Mr. Laffer, M.P., indicated that the wise course for the purchaser to follow was to secure his trees from reputable nurserymen.

### TRUCKING FACILITIES AT MELROSE RAILWAY STATION.

The Secretary intimated that reports had been received from the railway authorities that they did not consider that the time had arrived when trucking facilities, other than those which now existed, should be provided at Melrose railway station. Professor Perkins indicated that under present conditions great difficulty was experienced in loading and unloading stock. Mr. Laffer suggested that the local people should approach the Government through the members for the district. It was decided to acquaint the Mount Remarkable Branch of the Bureau with the position.

### WHEAT CERTIFICATES.

The Pinnaroo Branch wrote in regard to the manner adopted in issuing wheat certificates. At present the farmer had to give delivery of the interim receipt before receipt by the local agent of the certificate, they said, and as a consequence was for many days without any acknowledgment for the grain held on his behalf. The Board decided to refer the matter to the Wheat Harvest Board.

### RIVER MURRAY BRANCHES CONFERENCE.

A number of resolutions carried at the recent conference held at Waikerie was dealt with.

The Board determined to send on to the Minister of Agriculture resolutions relating to the provision of a Government steamer to trade on the river, the establishment of canning factories, and the more satisfactory carriage of fruit on steamers overseas. A resolution relating to experimental work on the river was referred to the Director of Agriculture.

### TRANSITION OF INDUSTRY AND TRADE.

A letter was received from the Secretary to the Premier (Mr. J. Sincock), referring to the proposed establishment of an advisory committee to report upon the best means of facilitating the transition of industry and trade from the war to the peace period. The communication concluded with a request from the Premier that the Board should nominate one of its members to represent it on the advisory committee. Mr. G. Jeffrey (Vice-Chairman) expressed warm sympathy with the proposal. He explained that while in Melbourne the previous day he visited one of the wool stores, and there saw 40 returned soldiers learning woolclassing. They all were earnest young men, and he believed the result would be very gratifying. There were limitations in regard to the work for woolclassers, but the rudiments were laid down for entrance to the higher branches of the wool trade, and he would be surprised if, in the years to come, some of those soldiers were not occupying positions of trust in both the buying and selling sides of the business. Mr. Jeffrey was chosen to represent the Board.

### HERBS.

Mr. Miller directed attention to a report which had appeared in the press to the effect that a man in Victoria was making £600 a year from the cultivation and sale of herbs, including thyme, sage, and marjoram. He believed that the business had big possibilities, and offered an admirable opportunity for women to engage in a pleasant outdoor occupation. He moved that a report should be obtained from the Government Horticultural Instructor (Mr. Quinn) on the market for herbs, and the outlook for their cultivation in this State. Mr. Jeffrey seconded the proposition, which was carried.

### LIFE MEMBER.

The name of Mr. F. Kraeger, of Eurelia, was added to the list of life members of the Agricultural Bureau.

### NEW MEMBERS.

The following additions to the rolls of existing Branches were approved:—

Narrung—George Thornley, John Critchley, Allen McNicol, John Neville; Wirrega—R. C. Hawker, H. C. Rogers; Millicent—L. G. Haines; Salt Creek—R. S. Frost; Wirrabara—Ed. Ayliffe; Forest Range—Les. Edwards; Pinnaroo—L. R. Letheby; Mundoora—M. Fuller; Yadnarie—Walter Kruger; Glencoe—N. A. Cameron; Mount Barker—Isaac Dutch; Mundalla—H. Warland; Ramco—Chas. Matthews, J. Matthews, Rofe Gosling; Laura—Wm. Bills, F. W. Shepherd, H. A. W. Walter; Pompoota—E. A. Sadler, W. A. Battams, W. E. Bulpitt, J. G. Gibson, P. L. Rundell, F. A. Patterson, J. A. E. Svesson, J. Stirling, J. G. Hopkins, W. O. Baumann, T. J. Letheby, A. Collingwood, S. J. Douglas, W. Caffrey, J. B. Munno, G. E. Machell, F. Opie, E. Clarke, H. A. Forster; Port Elliot—W. W. Hargreaves, D. Bamford; Wollowa—Sid. Gilbertson, Thomas Gibson; Mallala—S. Angus, K. C. Catt, J. C. Catt; Eurelia—J. Kildea, A. Hamilton, Joe Cummings, M. P. Daly, F. G. Huppatz, J. G. Badman; Milang—Wm. Scougall, Arthur Rogers, F. W. Deacon, A. B. Saltmarsh; Cummins—Ken. Slater, J. R. Durdin; Coonalpyn—R. A. Millswood; Meadows—C. E. Taylor, H. B. Michelmore, Arthur Verral; Mount Remarkable—E. H. Smith, N. A. Smith, J. R. Hocking, S. H. T. Best, E. W. Gifford, H. R. Freeman, F. Sleader, E. C. Cornish, F. Low, W. H. Oke, W. Girdham; Borrika—R. L. Cowled; Rosy Pine—P. O'Loughlin; Pinnaroo—E. J. Hoffmann; Glencoe—F. H. Jenner; Naracoorte—A. Wennerbom; Geranium—E. Chapman; Blyth—E. H. W. Eckermann, A. C. Grovermann; Berri—A. V. Mills, C. Cooper, E. J. R. Johnston, W. W. Shand, W. Morey; Clarendon—C. Morphett, H. Spencer, R. Harper; Pompoota—G. Barritt, J. McKay.

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# THE AGRICULTURAL OUTLOOK.

## REPORT FOR THE MONTH OF JUNE.

The following reports on the general agricultural condition and outlook of the areas represented by the Government Experimental Farms mentioned below have been prepared by the respective managers:—

*Booborowie.*—Weather—This month has been very cold, dull showery days with cold piercing winds, only one bright sunny day has been experienced, more than half the days in the month have been wet ones. Crops—A few of the first sown crops are showing through the ground, but the germination is very slow; the mice have thinned out a good deal of the wheat. Natural feed is fair for this district; the cold weather is checking its growth. Stock is in fair condition, but horse stock is going back as the hay is so badly damaged by the mice. Pests—Mice are still the leading pest and can give points to most others; but rabbits are coming along, and will occupy a front place shortly.

*Eyre's Peninsula.*—Weather—Plenty of rain was recorded for the first half of the month, falls being noted on 13 out of the first 15 days. The last fortnight has been fine, with odd showers, and two frosts were noticed. Altogether 262 points of rain were registered for the month, which is 1in. less than was received last June, and a few points below the average for the past three seasons. Over 9in. have been recorded for 1917 to date. Crops—All the early sown crops have germinated and are coming along well. Seeding is now practically completed. Approximately 800 acres have been sown to cereals in the hundred, of which about 200 acres were not sown until comparatively late. Natural Feed—Spear grass is very plentiful, and a little geranium is to be seen about. Very little except self-sown cereals is showing on last season's stubbles. Stock—A slight digestive ailment has been troubling some of two settlers' horses, due probably to stomach parasites or the roughness of feed. Pests—Rabbits are troublesome to many young crops. Birds are severe on sown but non-harrowed land. Mice are much more scarce.

*Kybybolite.*—Weather—This month has been one of little rain, 133 points being distributed over a fortnight, commencing on the 4th instant. Temperatures have been mild, with the exception of severe frosts on the 25th and 26th. Crops—Seeding operations have been considerably advanced, but a considerable area will be sown yet, weather permitting. Although we have had an unusually dry month some fallow lands are still too wet from the effects of the heavy May rains to permit of sowing. Crops that have germinated well are growing satisfactorily, but poor germinations have resulted over certain areas where sown under too wet conditions. Natural feed is plentiful and of fair length. Stock are in good order generally; sheep are looking exceptionally well, and lambing results are better than the average.

*Turretfield.*—Weather—During the month 192 points of rain were registered. Rain fell on 15 days, the highest fall for one day being 40 points. The weather generally was wet and cold, and one severe frost was experienced. Crops—Owing to the fact that the rain was spread over such a long period—the longest period of fine weather being five days—seeding operations were severely hampered. Farmers were forced to push on with their work, but the land was not in good condition for sowing. Early crops show a distinct yellow tinge, probably due to the water-logged condition of the soil. Natural feed is not making rapid growth. The lambing percentage throughout the district has been good. Stock is healthy, and in fair to good condition. Pests—Mice are still plentiful, but beyond some damage to the hay and wheat stacks are not doing much harm. Grain sown in the field does not seem to be interfered with.

*Veitch.*—Weather—Rainfall for the month to the 26th is 95 points. Veitch averaged for the same month 171 points. We have had a few heavy frosts during the past week followed by rather cold days. Crops—Early sown crops are forging ahead and making a nice plant. In parts of the district the later sown fields are having a tussle with mice; this pest has done so much damage that some fields will need resowing. Natural Feed—Good. Stock all doing well. Pests—Mice. Miscellaneous—The area under crop in this district this year is a good deal short of last season, so much time has been lost awaiting a good fall of rain to clear out mice.

## DAIRY AND FARM PRODUCE MARKETS.

A. W. Sandford & Co., Ltd., report on July 2nd:—

Butter.—Production during the month of June showed a substantial increase, so that this State no longer looks to the East for any of its supplies. Under the influence of the larger quantities coming forward values have receded, and rates at the close of the month for butter in pound prints were "Alfa," 1s. 4d.; "Primus," 1s. 3½d.; third grade creamery, 1s. 1d. to 1s. 1½d. per lb. The high prices that have been ruling for tops for some time have stimulated demand for choice separators and dairies, which sold at from 1s. to 1s. 2d. per lb.; fair quality, 11d. to 1s.; store and collectors', 11d. to 11½d. per lb.

Eggs.—The forwardings have considerably improved, and consequently larger quantities were offering than the market could readily absorb, so that in the absence of interstate trade to any extent, prices showed a very substantial drop, rates at the last market of the month being 10½d. per dozen loose for hen; duck, 11½d.

Cheese.—Stocks are shortening, but there is no alteration in quotations to chronicle, good business being put through both for local and export; values being from 9d. to 9½d. per lb. for large to loaf.

Honey.—It is late in the season to expect any consignments to come forward, only odd lots arriving which are readily cleared at 4¼d. to 4¾d. per lb. for prime clear extracted.

Almonds.—Prices have again advanced, but this has not interfered with demand, export orders being unfulfilled. Brandis, 11½d. to 1s.; mixed softshells, 11d. to 11½d.; hardshells, 6d.; kernels, 1s. 10d. per lb.

Bacon.—Values have eased, but not to any great extent considering the much larger quantities that are now coming to hand, but hams are finding slow sale. Best factory-cured sides, 10d. to 10½d.; middles and hams, 11d. to 11½d.; rolls, 9d. per lb.

Live Poultry.—Heavy pennings have been catalogued during the month, and to a good attendance of the trade spirited bidding ruled, prices all round showing a slight improvement. Heavy-weight table roosters, 2s. 9d. to 4s. 1d. each; nice-conditioned cockerels and plump hens, 2s. 3d. to 3s. 6d. each; light birds, 1s. 6d. to 2s.; ducks, 2s. 2d. to 4s. 1d. each; geese, 4s. 6d. to 5s. 9d. each; pigeons, 5d. to 6d. each; turkeys, from 7d. to 9½d. per lb. live weight for fair to good table birds.

Potatoes.—The potato market continues to be very freely supplied from the Mount Barker, Gumeracha, and Mount Gambier districts, and nearly all the crops being dug are yielding more heavily than was anticipated.

Onions.—Although most of the onion demands are still being filled from within the borders of South Australia, the tone of the market has improved considerably, and prices are a good 10s. better than last month. Quotations:—Potatoes, £4 to £4 10s. per ton on rails Mile End or Port Adelaide; onions, £5 15s. to £6 5s. per ton on rails Mile End or Port Adelaide.

# RAINFALL TABLE.

The following figures, from data supplied by the Commonwealth Meteorological Department, show the rainfall at the subjoined stations for the month of and to the end of June, 1917, also the average precipitation to the end of June, and the average annual rainfall.

| Station. | For June, 1917. | To end June, 1917. | Av'ge. to end June | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| **FAR NORTH AND UPPER NORTH.** | | | | |
| Oodnadatta | — | 3·28 | 3·06 | 4·76 |
| Tarcoola | 0·74 | 5·10 | 3·15 | 7·58 |
| Hergott | 0·20 | 2·67 | 3·29 | 6·04 |
| Farina | 0·72 | 3·67 | 3·73 | 6·70 |
| Leigh's Creek | 0·90 | 5·86 | 4·70 | 8·66 |
| Beltana | 1·23 | 6·81 | 4·87 | 9·22 |
| Blinman | 1·92 | 6·49 | 6·71 | 12·83 |
| Hookina | 4·19 | 13·19 | 5·10 | — |
| Hawker | 3·79 | 12·84 | 5·75 | 12·22 |
| Wilson | 3·23 | 9·73 | 5·66 | 11·78 |
| Gordon | 3·07 | 11·53 | 4·58 | 10·26 |
| Quorn | 2·92 | 9·78 | 6·18 | 13·78 |
| Port Augusta | 2·37 | 6·12 | 4·78 | 9·46 |
| Port Augusta W. | 2·48 | 6·64 | 4·40 | 9·36 |
| Bruce | 2·13 | 7·58 | 4·42 | 10·01 |
| Hammond | 2·45 | 10·69 | 5·15 | 11·46 |
| Wilmington | 3·27 | 10·23 | 8·23 | 18·26 |
| Willowie | 2·54 | 9·92 | 5·21 | 11·90 |
| Melrose | 4·67 | 16·60 | 10·71 | 23·04 |
| Booleroo Centre | 2·76 | 11·22 | 6·95 | 15·83 |
| Port Germein | 2·70 | 8·34 | 6·11 | 12·84 |
| Wirrabara | 3·37 | 13·26 | 8·58 | 18·91 |
| Appila | 2·04 | 9·60 | 6·71 | 15·08 |
| Cradock | 2·73 | 9·98 | 5·10 | 10·86 |
| Carrieton | 2·74 | 11·44 | 5·48 | 12·22 |
| Johnburg | 2·72 | 9·44 | 4·50 | 10·21 |
| Eurelia | 2·81 | 11·74 | 5·86 | 13·24 |
| Orroroo | 2·45 | 11·45 | 6·31 | 13·42 |
| Black Rock | 2·09 | 10·48 | 5·71 | 12·25 |
| Petersburg | 2·25 | 11·38 | 5·73 | 13·07 |
| Yongala | 2·09 | 11·45 | 6·10 | 13·94 |
| **NORTH-EAST.** | | | | |
| Ucolta | 2·10 | 9·92 | — | — |
| Nackara | 1·63 | 9·45 | 4·04 | — |
| Yunta | 2·53 | 9·59 | 4·41 | 8·22 |
| Waukaringa | 2·31 | 8·30 | 3·96 | 7·94 |
| Mannahill | 2·03 | 7·40 | 4·11 | 8·46 |
| Cockburn | 0·64 | 7·12 | 4·13 | 7·97 |
| Broken Hill, NSW | 0·42 | 8·23 | 4·89 | 9·63 |
| **LOWER NORTH.** | | | | |
| Port Pirie | 2·03 | 8·68 | 6·46 | 13·21 |
| Port Broughton | 1·62 | 6·92 | 8·86 | 14·33 |
| Bute | 2·15 | 9·28 | 7·20 | 15·42 |
| Laura | 2·66 | 11·11 | 8·02 | 18·22 |
| Caltowie | 2·13 | 10·16 | 7·39 | 17·27 |
| Jamestown | 2·15 | 10·67 | 7·44 | 17·46 |
| Gladstone | 2·50 | 10·46 | 6·98 | 16·00 |
| Crystal Brook | 2·68 | 9·70 | 7·08 | 15·62 |
| Georgetown | 2·71 | 11·39 | 8·22 | 18·32 |
| Narridy | 2·28 | 10·05 | 7·58 | 16·79 |
| Redhill | 2·69 | 10·67 | 7·70 | 16·79 |
| **LOWER NORTH—*continued.*** | | | | |
| Spalding | 2·99 | 11·45 | 8·19 | 20·25 |
| Gulnare | 2·81 | 11·29 | 7·54 | 19·74 |
| Bundaleer W. Wks. | 3·14 | 11·04 | 7·01 | 17·29 |
| Yacka | 1·93 | 9·77 | 6·84 | 15·27 |
| Koolunga | 2·21 | 10·59 | 7·13 | 15·94 |
| Snowtown | 2·15 | 9·78 | 7·31 | 15·70 |
| Brinkworth | 2·65 | 10·22 | 6·91 | 15·48 |
| Blyth | 2·40 | 10·79 | 7·58 | 16·34 |
| Clare | 3·33 | 16·56 | 10·95 | 24·30 |
| Mintaro Central | 3·73 | 17·38 | 9·62 | 21·99 |
| Watervale | 3·50 | 19·27 | 12·28 | 27·17 |
| Auburn | 3·22 | 17·62 | 10·19 | 24·25 |
| Hoyleton | 3·06 | 11·71 | 8·18 | 17·96 |
| Balaklava | 1·79 | 8·71 | 7·44 | 16·03 |
| Port Wakefield | 1·78 | 9·40 | 6·69 | 13·13 |
| Terowie | 1·81 | 8·87 | 5·85 | 13·71 |
| Yarcowie | 2·03 | 10·17 | 6·15 | 13·91 |
| Hallett | 1·63 | 7·88 | 6·95 | 16·40 |
| Mount Bryan | 1·62 | 8·40 | 6·77 | 15·73 |
| Burra | 1·76 | 9·24 | 8·01 | 17·82 |
| Farrell's Flat | 2·29 | 9·18 | 8·46 | 18·87 |
| **WEST OF MURRAY RANGE.** | | | | |
| Manoora | 2·63 | 12·41 | 7·93 | 18·09 |
| Saddleworth | 2·51 | 12·17 | 9·06 | 19·69 |
| Marrabel | 3·27 | 12·37 | 8·58 | 18·94 |
| Riverton | 2·80 | 14·75 | 9·42 | 20·48 |
| Tarlee | 2·31 | 11·51 | 7·62 | 17·48 |
| Stockport | 1·94 | 11·62 | 7·36 | 15·89 |
| Hamley Bridge | 1·89 | 9·07 | 7·73 | 16·45 |
| Kapunda | 2·13 | 11·26 | 9·03 | 19·67 |
| Freeling | 2·42 | 9·67 | 8·20 | 17·85 |
| Greenock | 2·63 | 11·78 | 9·62 | 21·46 |
| Truro | 2·56 | 11·38 | 8·85 | 19·74 |
| Stockwell | 2·51 | 10·95 | 8·02 | 20·30 |
| Nuriootpa | 2·74 | 11·15 | 9·43 | 21·25 |
| Angaston | 2·99 | 12·97 | 9·97 | 22·25 |
| Tanunda | 2·77 | 12·02 | 10·29 | 22·28 |
| Lyndoch | 3·14 | 12·45 | 10·24 | 23·01 |
| **ADELAIDE PLAINS.** | | | | |
| Mallala | 1·74 | 8·79 | 7·91 | 16·88 |
| Roseworthy | 2·21 | 10·25 | 8·09 | 17·31 |
| Gawler | 2·28 | 11·92 | 9·05 | 19·21 |
| Two Wells | 1·68 | 7·33 | 7·87 | 16·36 |
| Virginia | 2·04 | 10·40 | 8·36 | 17·58 |
| Smithfield | 2·10 | 11·98 | 8·23 | 17·30 |
| Salisbury | 2·92 | 11·36 | 8·97 | 18·57 |
| North Adelaide | 3·06 | 16·44 | 11·21 | 21·49 |
| Adelaide | 2·61 | 13·82 | 10·14 | 21·04 |
| Brighton | 5·76 | 17·51 | 10·51 | — |
| Glenelg | 2·30 | 12·18 | 8·95 | — |
| Magill | 4·13 | 18·41 | 12·24 | 19·93 |

## RAINFALL—*continued.*

| Station. | For June, 1917. | To end June, 1917. | Av'ge. to end June. | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| ADELAIDE PLAINS—*continued.* | | | | |
| Glen Osmond | 4·15 | 19·55 | 12·17 | 25·26 |
| Mitcham | 3·27 | 15·23 | 11·25 | 23·47 |
| Belair | 4·53 | — | 13·84 | 28·64 |
| MOUNT LOFTY RANGES. | | | | |
| Teatree Gully | 4·41 | 18·87 | 13·54 | 28·19 |
| Stirling West | 8·56 | 34·34 | 21·61 | 46·70 |
| Uraidla | 7·64 | 35·36 | 20·64 | 44·35 |
| Clarendon | 4·30 | 19·77 | 15·69 | 33·67 |
| Morphett Vale | 3·59 | 14·09 | 10·85 | 23·32 |
| Noarlunga | 3·30 | 14·25 | 9·47 | 20·28 |
| Willunga | 4·37 | 17·82 | 12·05 | 25·98 |
| Aldinga | 3·36 | 14·04 | 9·54 | 20·34 |
| Normanville | 2·69 | 12·26 | 9·85 | 20·65 |
| Yankalilla | 3·16 | 14·57 | 11·29 | 22·78 |
| Cape Jervis | 3·00 | 10·40 | 7·59 | 16·34 |
| Mount Pleasant | 4·42 | 15·39 | 12·15 | 26·87 |
| Blumberg | 5·53 | 19·35 | 13·25 | 29·38 |
| Gumeracha | 5·63 | 23·04 | 14·45 | 33·30 |
| Lobethal | 5·28 | 14·23 | 15·87 | 35·38 |
| Woodside | 6·13 | 21·31 | 14·07 | 31·87 |
| Hahndorf | 5·41 | 18·59 | 15·40 | 35·45 |
| Nairne | 4·56 | 17·04 | 13·01 | 28·83 |
| Mount Barker | 5·49 | 21·70 | 13·78 | 30·93 |
| Echunga | 5·28 | 21·42 | 15·27 | 32·83 |
| Macclesfield | 4·19 | 18·72 | 13·46 | 30·72 |
| Meadows | 5·41 | 25·05 | 16·17 | 35·52 |
| Strathalbyn | 2·10 | 10·22 | 8·83 | 19·28 |
| MURRAY FLATS AND VALLEY. | | | | |
| Wellington | 1·35 | 8·27 | 7·05 | 15·01 |
| Milang | 1·64 | 7·41 | 7·54 | 16·08 |
| Langhorne's Brdg | 1·36 | 7·71 | 6·71 | 15·27 |
| Tailem Bend | 1·58 | 10·10 | 6·42 | — |
| Murray Bridge | 1·14 | 6·39 | 6·66 | 14·32 |
| Callington | 1·70 | 8·04 | 7·21 | 15·65 |
| Mannum | 1·18 | 5·56 | 5·71 | 11·67 |
| Palmer | 2·44 | 7·93 | 6·09 | 15·60 |
| Sedan | 1·55 | 6·26 | 5·75 | 11·92 |
| Blanchetown | 0·67 | 2·19 | 5·09 | — |
| Eudunda | 2·09 | 8·48 | 7·81 | 17·33 |
| Sutherlands | 1·19 | 4·08 | 4·71 | 10·71 |
| Morgan | 1·00 | 3·23 | 4·19 | 10·60 |
| Waikerie | 1·00 | — | — | — |
| Overland Corner | 0·88 | 4·89 | 5·33 | 11·42 |
| Renmark | 1·39 | 7·30 | 4·79 | 10·93 |
| Loxton | 1·11 | 8·82 | 4·38 | — |
| WEST OF SPENCER'S GULF. | | | | |
| Eucla | 1·33 | 6·99 | 5·56 | 10·13 |
| White Well | 1·68 | 6·87 | 4·29 | 9·67 |
| Fowler's Bay | 2·62 | 9·60 | 6·19 | 12·11 |
| Penong | 2·31 | 8·35 | 5·12 | 11·93 |
| Murat Bay | 1·62 | 7·28 | 4·81 | — |
| Smoky Bay | 2·78 | 8·11 | — | — |
| Streaky Bay | 5·21 | 11·42 | 7·38 | 15·31 |

| Station. | For June, 1917. | To end June, 1917. | Av'ge. to end June. | Av'ge. Annual Rainfall |
|---|---|---|---|---|
| WEST OF SPENCER'S GULF—*continued.* | | | | |
| Port Elliston | 4·10 | 12·45 | 7·75 | 16·49 |
| Port Lincoln | 4·60 | 12·33 | 9·23 | 19·88 |
| Tumby Bay | 1·95 | 7·63 | 7·24 | 15·00 |
| Carrow | 3·40 | 12·28 | — | — |
| Cowell | 1·61 | 6·41 | 5·76 | 11·76 |
| Point Lowly | 1·64 | 6·88 | 5·35 | 12·21 |
| Cummins | 3·23 | — | — | — |
| YORKE'S PENINSULA. | | | | |
| Wallaroo | 2·11 | 8·49 | 7·14 | 14·05 |
| Kadina | 2·72 | 9·32 | 7·75 | 15·88 |
| Moonta | 1·92 | 9·75 | 7·72 | 15·22 |
| Green's Plains | 2·05 | 8·62 | 7·35 | 15·73 |
| Maitland | 2·79 | 13·54 | 9·62 | 20·08 |
| Ardrossan | 2·00 | 8·51 | 6·71 | 13·89 |
| Port Victoria | 1·86 | 10·46 | 7·53 | 15·21 |
| Curramulka | 2·74 | 12·17 | 8·48 | 18·50 |
| Minlaton | 4·27 | 13·40 | 8·23 | 17·41 |
| Stansbury | 2·70 | 13·04 | 7·90 | 17·06 |
| Warooka | 3·44 | 13·05 | 8·06 | 17·71 |
| Yorketown | 3·64 | 11·47 | 8·00 | 17·47 |
| Edithburgh | 3·62 | 12·06 | 7·91 | 16·48 |
| SOUTH AND SOUTH-EAST. | | | | |
| Cape Borda | 4·46 | 12·15 | 12·09 | 25·09 |
| Kingscote | 3·01 | 11·37 | 8·76 | 18·95 |
| Penneshaw | 2·80 | 9·55 | 10·10 | 21·34 |
| Cape Willoughby | 3·26 | 10·88 | 8·89 | 19·69 |
| Victor Harbor | 2·75 | 13·00 | 10·13 | 22·18 |
| Port Elliot | 2·91 | 12·21 | 9·35 | 20·33 |
| Goolwa | 2·50 | 11·96 | 7·37 | 17·93 |
| Pinnaroo | 1·55 | 7·22 | 6·76 | 16·74 |
| Parilla | 1·54 | 7·19 | — | — |
| Lameroo | 1·39 | 7·58 | 7·14 | 16·55 |
| Parrakie | 1·17 | 7·83 | 6·07 | — |
| Geranium | 1·47 | 9·50 | 5·91 | — |
| Peake | 1·98 | 10·16 | 7·13 | — |
| Cooke's Plains | 1·88 | 10·29 | 6·68 | 14·74 |
| Meningie | 1·95 | 11·33 | 8·71 | — |
| Coonalpyn | 1·99 | 11·37 | 7·77 | 17·49 |
| Coomandook | 2·07 | 11·75 | 7·63 | 16·80 |
| Tintinara | 2·41 | 11·00 | 8·16 | 18·78 |
| Keith | 1·93 | 10·59 | 7·96 | — |
| Bordertown | 1·36 | 11·10 | 8·62 | 19·76 |
| Wolseley | 1·07 | 8·68 | 7·84 | 17·72 |
| Frances | 1·37 | 9·53 | 8·51 | 20·74 |
| Naracoorte | 1·90 | 11·18 | 10·04 | 22·60 |
| Penola | 2·50 | 12·74 | 10·75 | 26·78 |
| Lucindale | 2·54 | 11·52 | 10·18 | 23·32 |
| Kingston | 2·54 | 13·27 | 11·50 | 24·73 |
| Robe | 2·38 | 10·77 | 11·39 | 24·69 |
| Beachport | 2·28 | 12·52 | 13·02 | 27·51 |
| Millicent | 2·84 | 13·41 | 13·76 | 29·25 |
| Mount Gambier | 2·74 | 14·04 | 14·13 | 32·00 |
| C. Nrthumberland | 2·58 | 12·65 | 12·08 | 26·63 |

# AGRICULTURAL BUREAU REPORTS.

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| Arden Vale & Wyacca | * | — | — |
| Arthurton | * | — | — |
| Balaklava | * | — | — |
| Beaufort | * | — | — |
| Beetaloo Valley | 996 | — | — |
| Belalie North | 999 | 28 | — |
| Berri | † | 4 | 1, 29 |
| Blackheath | 1016 | — | 4 |
| Blackwood | 1016 | 16 | 20 |
| Blyth | 999 | 14 | — |
| Bookpurnong East | ‡ | — | — |
| Booleroo Centre | 1000 | — | — |
| Borrika | 1006 | — | — |
| Bowhill | * | — | — |
| Brentwood | ‡ | 5 | — |
| Brinkley | 1015 | — | — |
| Bundaleer Springs | 996 | — | — |
| Burra | * | — | — |
| Bute | * | — | — |
| Butler | 1004–6 | — | — |
| Caltowie | * | — | — |
| Canowie Belt | § | — | — |
| Carrieton | 995 | — | — |
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| Clarendon | 1018 | 2, 30 | — |
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| Colton | * | — | — |
| Coomandook | * | — | — |
| Coomooroo | * | — | — |
| Coonalpyn | * | — | — |
| Coonawarra | * | — | — |
| Coorabie | * | — | — |
| Cradock | † | — | — |
| Crystal Brook | ‡ | — | — |
| Cummins | 1004 | 7 | 4 |
| Cygnet River | † | 5 | 2 |
| Davenport | * | — | — |
| Dawson | * | — | — |
| Denial Bay | * | — | — |
| Dowlingville | † | — | — |
| Edillilie | * | — | — |
| Elbow Hill | 1004 | — | — |
| Eurelia | * | 27 | — |
| Forest Range | * | — | — |
| Forster | † | — | — |
| Frances | * | — | — |
| Freeling | * | 5 | 2 |
| Gawler River | 1000 | 2 | 6 |
| Georgetown | * | — | — |
| Geranium | † | 28 | 25 |
| Gladstone | * | — | — |
| Glencoe | 1021–2 | — | — |
| Glencope | * | — | — |
| Goode | * | — | — |
| Green Patch | * | — | — |
| Gumeracha | * | — | — |
| Halidon | 1015 | — | — |
| Hartley | 1018 | 4 | 29 |
| Hawker | * | 1 | — |
| Hilltown | * | — | — |
| Hookina | * | 3, 31 | 28 |
| Inman Valley | 1021 | — | — |
| Ironbank | § | — | — |
| Julia | * | — | — |
| Kadina | * | — | — |
| Kalangadoo | 1022 | 14 | 11 |
| Kanmantoo | 1021 | 28 | 25 |
| Keith | * | — | — |
| Ki Ki | 1015 | — | — |
| Kingscote | * | — | — |
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| Kongorong | 1023 | 3, 31 | 28 |
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| Koppio | ‡ | 3 | — |
| Kybybolite | * | — | 2 |
| Lameroo | * | — | — |
| Laura | * | — | — |
| Leighton | 997 | 2 | 30 |
| Lone Pine | 1000 | 10 | 7 |
| Longwood | 1021 | — | — |
| Loxton | * | — | — |
| Lucindale | * | — | — |
| Lyndoch | 1003 | 5 | 2, 30 |
| MacGillivray | 1019 | — | — |
| Maitland | * | — | — |
| Mallala | 1003 | 9 | 13 |
| Mangalo | * | — | — |
| Mantung | † | 5 | 4 |
| Meadows South | * | — | — |
| Meningie | * | — | — |
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|---|---|---|---|---|---|---|---|
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| Miltalie | 1005 | 28 | — | Port Germein | * | — | — |
| Mindarie | * | 2 | 6 | Port Pirie | 999 | 28 | — |
| Minlaton | *5 | — | 3, 31 | Quorn | * | 28 | — |
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| Monarto South | 1003 | — | — | Riverton | * | — | — |
| Moonta | 100 | — | — | Roberts and Verran | * | — | — |
| Moorlands | * | — | — | Rosenthal | † | 4 | 1 |
| Morchard | * | — | — | Rosy Pine | 1014 | — | — |
| Morgan | † 1 | — | — | Saddleworth | * | — | — |
| Morphett Vale | 1021 | — | — | Salisbury | 1001 | — | — |
| Mount Barker | 102 | 4 | 1 | Salt Creek | 1005 | — | — |
| Mount Bryan | * | — | — | Sandalwood | 1028 | — | — |
| Mount Bryan East | * | — | — | Sherlock | † | — | — |
| Mount Compass | † 5 | — | — | Spalding | * | — | — |
| Mount Gambier | 102 | — | — | Stockport | * | — | — |
| Mount Hope | * | — | — | Strathalbyn | 1021 | 3, 31 | 28 |
| Mount Pleasant | * | — | — | Sutherlands | * | — | — |
| Mount Remarkable | † | — | — | Tantanoola | * | 7 | 4 |
| Mundalla | † | 11 | 8 | Tarcowie | * | — | — |
| Mundoora | * | — | — | Tatiara | * | 7 | 4 |
| Murray Bridge | * | — | — | Tintinarra | § | — | — |
| Mypolonga | † | 4 | 1 | Two Wells | * | — | — |
| Myponga | * | — | — | Uraidla and Summert'n | 1021 | 2 | 6 |
| Myrla | * | — | — | Waikerie | * | 27 | 31 |
| McNamara Bore | * | — | — | Warcowie | * | — | — |
| Nantawarra | * | — | — | Warrow | * | — | — |
| Naracoorte | 1025 | — | — | Watervale | 1003 | — | — |
| Narridy | 1000 | — | — | Wepowie | 996 | 28 | 25 |
| Narrung | ‡ | — | — | Whyte-Yarcowie | * | — | — |
| Netherton | * | — | — | Wilkawatt | 1015 | — | — |
| North Booborowie | 998 | — | — | Willowie | 996 | 3, 31 | — |
| North Bundaleer | * | — | — | Wilmington | † | — | — |
| Northfield | 1001 | 3 | 2 | Wirrabara | 999 | — | — |
| Orroroo | * | — | — | Wirrega | * | — | — |
| Parilla | * | 5 | — | Wollowa | * | — | — |
| Parilla Well | * | — | — | Woodleigh | * | — | — |
| Parrakie | * | — | — | Woodside | * | — | — |
| Paskeville | * | — | — | Wynarka | 1015 | — | — |
| Penola | † | — | — | Yabmana | § | — | — |
| Penong | 1006 | 14 | 11 | Yacka | 999 | — | — |
| Petina | * | — | — | Yadnarie | 1005 | — | — |
| Pine Forest | * | — | — | Yallunda | * | — | — |
| Pinnaroo | 1007 | — | — | Yaninee | * | — | — |
| Pompoota | 1009-15 | — | — | Yeelanna | * | — | — |
| Port Broughton | * | — | — | Yongala Vale | ‡ | 2, 27 | 31 |
| Port Elliot | 1021 | 21 | 18 | Yorketown | * | — | — |

* No report received during the month of June. † Formal report only received.
‡ Held over until next month. § In recess until termination of war.

# ADVISORY BOARD OF AGRICULTURE.

## Date of Meeting—July 11th and August 8th, 1917.

# THE AGRICULTURAL BUREAU OF SOUTH AUSTRALIA.

**Every producer should be a member of the Agricultural Bureau. A postcard to the Department of Agriculture will bring information as to the name and address of the secretary of the nearest Branch.**

**If the nearest Branch is too far from the reader's home, the opportunity occurs to form a new one. Write to the department for fuller particulars concerning the work of this institution.**

## MEMORANDA FOR THE MONTH.

CONGRESS.—The Twenty-eighth Annual Congress will take place in the Osborne Hall, Gouger Street, Adelaide, on Monday, September 10th, Tuesday, 11th, and Wednesday, 12th. A large number of subjects was suggested by Branches, and the agenda is now being considered, due regard being given the suggestions of Branches.

BRANCHES' ANNUAL MEETING.—Owing to the necessity for economising space, the reports prepared by Hon. Secretaries of Branches will not be published in the *Journal* in any but exceptional circumstances, and when no other business has been transacted at the meeting, it will be recorded in the index to reports as ''formal.'' Nevertheless Hon. Secretaries should not neglect to forward a copy of the annual report to the Secretary of the Advisory Board.

MEMBERSHIP.—The third of the members on the roll, viz., those who have attended the fewest meetings, should retire at the end of the year. Any or all of these are eligible for re-election should the Branch be disposed to recommend their reappointment.

## FARM COMPETITIONS.

### DISTRIBUTION OF PRIZES AT NARACOORTE.

At the monthly meeting of the Naracoorte Branch of the Agricultural Bureau, held on May 12th, the Farm Competitions Committee presented its first annual report. It was mentioned that there had been 22 entries in the series of competitions held during the year, and as a result of the 12 months' experience, the committee made several suggestions, the adoption of which it was thought, would be beneficial.

The distribution of prizes to the successful competitors was entrusted to Mr. W. H. Smith, formerly Hon. Secretary to the Branch, and to whose energy the inauguration of the competition was due. In presenting the prizes, Mr. Smith said he believed such competitions would lead to improved methods of farming, which in turn would mean an increased production, and a consequent benefit to the town, the district, and the State.

The awards were as follows:—Best-kept farm, over 500 acres—First, Mr. J. M. Wray; second, Mr. R. A. Miles. Best-kept farm, under 500 acres—First, Mr. T. Waugh; second, Mr. Scholz. Best crop of wheat—First Mr. A. Bradley; second, Mr. R. A. Miles. Fallow—First, Mr. W. Loller; second, Mr. Schinckel. Crop of oats—First Mr. R. A. Miles; second, Messrs. D. Kay and Miles.

# REPORTS OF BUREAU MEETINGS.

## UPPER-NORTH DISTRICT.

### (PETERSBURG AND NORTHWARD.)

### CARRIETON (Average annual rainfall, 12.22in.).

May 31st.

TREE PLANTING.—Mr. F. Kaerger contributed a short paper on this subject, in the course of which he mentioned that ploughing several deep furrows has been found more successful as a preparation for planting trees than digging holes. To secure a quick germination of wattle seed, he advised soaking them in boiling water and leaving in a warm place for 24 hours. After that, if sown in a well-worked furrow, the plants should be up in 10 or 14 days. He recommended that wattle seed should be gathered about the end of December. In the discussion which followed, it was agreed that ploughing the ground was better than digging holes for the trees.—A discussion took place on the mice plague. The Chairman recommended placing all seed wheat and horse feed, such as grain and chaff, on a mice-proof stand, made by placing short posts in the ground, with kerosine tins with the tops cut out inverted over the posts.

WEPOWIE (Average annual rainfall, 13in. to 14in.).
June 2nd.—Present: 13 members and one visitor.

Annual Meeting.—The Hon. Secretary (Mr. T. F. Orrock) read the annual report, which was followed by the election of officers. ''More Production'' was the subject of a paper contributed by Mr. J. Burns. He advised members to economise in men, but to spend on machinery and horses wherever possible. Seeding should be commenced when the ground was moist, preferably after a nice rain, and the grain drilled in to a depth of 2in. or 3in. While mice were so troublesome it was a good plan to drag a chain or a set of harrows after the drill, thus saving an extra team of horses. It was not advisable to sow too thickly on fruitful soil, as besides being wasteful, it was injurious to the crop. Should the soil be too wet, too dry, or mice prevalent in the fields, then one could sow more seed to allow for some seeds not germinating. Another factor to be considered was to see that the wheat was graded and picked, which would materially increase the yield at harvest time. He favored land dressed with super. at the rate of 80lbs. to 100lbs. per acre.

WILLOWIE, June 8th.—Irrigation—A short paper under this heading was contributed by Mr. W. B. Bull, who referred to the importance of irrigating where intense culture was practised. He mentioned the success which had attended water conservation and reticulation schemes, not only in modern times, but in ancient days.

## MIDDLE-NORTH DISTRICT.

### (PETERSBURG TO FARRELL'S FLAT.)

BEETALOO VALLEY (Average annual rainfall, 18in. to 19in.).
June 4th.—Present: nine members and three visitors.

How to Make Farm Life Attractive.—One of the chief attractions of farm life, said Mr. W. Pearce, in dealing with this subject, is to have the animals on the farm as near perfection as possible. The time spent in caring for and studying the animals would repay in many ways. Any improvement of the farm, such as a well laid out stable, good sheds, &c., all tended to make the surroundings more congenial. Mr. Burton considered that fruit trees and flowers were necessary. Mr. Berry thought that social life on the farm was also essential. The majority of members favored the use of the oil engine for chaffcutting, owing to the high price of petrol. Mr. Berry spoke of the prevalence of weevil in wheat.

Handling Steers.—Mr. D. Boehm read a paper on this subject. The first requirement was a good strong post-and-rail fence. A good plan to catch the steer was to drive him up on the offside of an old worker and then yoke them together. It was unwise to keep the young steer bowed for too long a time, as that tended to make the neck sore. The animal should not be illtreated, or it would cause a good deal of trouble. Messrs. Clogg and Cox thought for rough work steers were equal to horses.

BUNDALEER SPRINGS.
May 30th.—Present: eight members and four visitors.

Poultry on the Farm.—Mr. S. H. Ellis contributed a paper on this subject. He advocated the keeping of only fowls of a good type, and favored White Leghorns with a few Black Orpingtons to do the rearing of chickens. By the outlay of extra capital in the first place on a breeding pen of some well-tried variety of White Leghorn laying strain, and by hatching in the spring months, the pullets would begin to lay in February, and continue for 12 months without moulting.

Warm quarters for winter were recommended, and the studying at all times of the comfort and convenience of the birds. Dust baths were essential, and disinfecting houses and spraying to eradicate tick and poultry mites were equally necessary. Perches should be low, and all of the same height (18in. to 2ft. being high enough), made of 2in. x 1in. timber fixed on 2in. x 2in. jarrah uprights. The low perch saved quarrelling over high positions at night, and was better for the fowls when flying off in the morning. In the matter of sickness in poultry, unless the bird be specially valuable the best plan was to resort to heroic measures and introduce the axe to the sickly one, afterwards cremating or burying deeply. Feeding grain in the morning in good clean scratching litter and mash at night in troughs was recommended, with plenty of chaffed green feed in the latter. Plenty of clean water, well shaded from the heat in summer should be supplied at all times, and drinking vessels scoured and disinfected regularly. Nests should be low and dark, and secluded to prevent egg-eating. A cockerel of 12 months and six to nine hens, two years old, should form the breeding stock, selected for vigor and health. In order to distinguish cockerels from pullets they should be kept in a yard by themselves. It was not wise to keep hens after the third year. They should then make room for younger stock. A discussion followed, in which Mr. Giles stated that in view of the mischief which fowls caused in stable mangers, and on harness and machinery, he preferred keeping them confined to a yard about 50yds. square. He favored Black Orpingtons as a general purpose bird, and advocated keeping roosters separate from laying hens, as infertile eggs were best for market purposes. Mr. O'Dea favored keeping a good strain of White Leghorns, which he found were no worse for flying into mischief than crossbred fowls were. The subject of fattening was raised by Mr. J. Travers, and it was considered best to keep the fowls so to be treated in a small yard and fed liberally on fattening foods.

### LEIGHTON (Average annual rainfall, 16in. to 17in.).

May 3rd.—Present: 11 members.

Forestry.—This subject was dealt with in the following paper by Mr. Tim. Hogan. The subject of tree planting, he said, deserved consideration, whether it be for the beautification of parks, or streets, or private properties, or for shelter for stock and people, and the supply of woods for generations to come, and Nature's requirements for atmospheric conditions. It therefore places every man or woman, especially farmers and others living on large areas of land, under an obligation to plant trees, instead of, as was the general rule throughout the world, destroying timber, and not planting to replace the wastage caused. Taking their own local district, they were situated in one of the most fertile localities in the State, which had been left by Nature almost devoid of timber; therefore their motto should be to plant, and plant unsparingly, especially breaks for shelter from the cold winds of winter and the hot sun of summer, for stock, and for future generations of farmers of the district for the supply of timber, the natural supply of which every year was being not only diminished, but also the quality was getting worse. If every farmer were to lay out to plant with trees at least one acre of every hundred he possessed, not necessarily at once, they would confer a great benefit on the country. The variety of trees depended to a great extent on the nature of the soil; but for an all-round useful as well as ornamental tree, the sugar gum took a power of beating, as well as being a quick grower in nearly all classes of soil. The red gum was perhaps the most valuable tree, but required a better class of soil; but wherever it could be planted it should be. Pines also did well in some soils, especially slaty, limestone country, and were a very nice ornamental tree for planting around the homestead. In conclusion, never knock off the planting until there was a good solid fence around the plantation, as the trees could not grow if they were being continually knocked about by stock. A good discussion followed.

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### MINTARO.

May 5th.

Seeding.—Mr. A. L. Sandow prepared a paper in which he said:—"In the first place I would recommend most careful attention to the implements used for seed time. The drill should be well overhauled, any cogs showing the worse for wear should be replaced. A little addition I would suggest for a farmer to add to his drill is a piece of ½in. or ⅝in. rod of iron running from the ends of one pole across to the other. More particularly this applies to either a four or five horse drill.

With a rod running across the ends if a pole strikes a post it brings the strain on both poles, and saves a breakage. When turning the drill at the end of the paddock from which you are filling, do not turn the drill right around on the mark for starting, but stop half-way, or the nearest possible position to the manure and seed. Then the cultivator should have the most careful attention. Every tine should be perfectly true, the frame of the implement should be free from any strain, and the shares should be so running as to give plenty of lap to ensure killing every weed. A good set or two of light harrows should always be at hand; they should not be too heavy in the event of harrowing after the drill. Another thing which should be attended to is the harness. The preparation of the seed wheat is of most importance. In this particular season the first problem is to protect the seed from mice. A very good plan for one is to put the wheat on the trolly or wagon and put pieces of tin around the wheels. Another common practice is to make a stand on about half a dozen posts in the ground with a petrol tin put over the top of each. This also proves very satisfactory. The seed should be thoroughly cleaned or graded. If any foreign small seeds are in the wheat, and a winnower is used for cleaning, a drake screen should be added. The wheat should not be pickled more than 30 hours before being sown, preferably using formalin, this being the least injurious to the germination of the plant, and also very convenient for applying the liquid. If the soil is carefully and intelligently prepared, even with a very small rainfall good results may be obtained. This was evidenced on many farms in this district in 1914, when we had the smallest rainfall on record. I would insist on early fallowing, particularly where there is much stubble or rubbish to be ploughed under. Burn the stubble off a paddock which you intend fallowing, and cultivate it early in March, perhaps after a summer rain. This will hold the moisture, and will work freely late in the season, otherwise it may be too hard to plough. After ploughing the land ordinarily it should be allowed to remain untouched for a few weeks to allow the rain, sun, and air to act on it before harrowing. When the land is harrowed directly behind the ploughs the ground becomes too sour. The result is that the harrows work the land into such a condition that it is impossible to get it back to a nice tilth. Avoid harrowing the very red ground. Its tendency is always to run together too much. About October and November in this district the cultivator should be put through the fallow at a depth not exceeding 3in., and great care should be taken to cut all the weeds. After this until seed time the sheep should be allowed frequently to run over the fallow paddocks to keep down any weeds that may appear. After every summer rain make it a habit to run the sheep over the fallow. A fair-sized flock of sheep running over fallow after rain is almost like a very light set of harrows shifting the surface, at the same time compressing the subsoil and thus creating a good seedbed.''

## NORTH BOOBOROWIE (Average annual rainfall, 16.35in.).

May 9th.—Present: five members.

Fly-Blown Sheep.—Mr. W. E. Hannaford introduced this subject. It was noted how, of late years, the flies had become very much worse, and whereas formerly they confined their attentions to wounds, blood, &c., on sheep, now they struck healthy sheep and the unsoiled wool on any part of the body. All the authorities quoted conceded the fact that no treatment gave more than temporary immunity from the flies. The most thorough dipping only ensured protection from blowing for a few weeks, as also did crutching. It was allowed that the only means of combating the trouble was constant attention to the sheep, and immediate treatment of the sheep when blown, and of those likely to be blown, at times when flies were particularly bad. The treatment recommended was to subject the affected parts on those likely to become blown to a very strong jet of sheep dip, it being necessary to use the powder dip, to keep it well stirred, and by means of an engine or other adequate power to maintain a sufficiently high pressure to ensure the powder being carried right through the wool into the skin. The above treatment had several advantages over dipping. A large number of sheep could be treated in a very short time. A light portable plant could be taken from place to place, and the sheep treated out in the paddock, anywhere a yard was available, obviating the necessity for driving sheep to a dip. While dipping was not always safe under certain conditions of weather, no harm could be done by the strong jet unless the sheep were heated.

### PORT PIRIE (Average annual rainfall, 13.21in.).

May 5th.—Present: seven members and one visitor.

**Curing Bacon.**—A paper dealing with this question was contributed by Mr. H. Johns. He said pigs should be killed preferably at a weight of about 130lbs. The animal should be killed on a cold night, if possible, as that gave the meat a chance to set firmly. After cutting up the two sides and hams, they should be put in a cool place and sprinkled with pure salt; that would remove all bloodstains. To prepare the mixture for curing, 6lbs. salt, 3lbs. brown sugar, ¼lb. pepper, ¼lb. saltpetre, and ¼lb. soda were necessary. The mixture should be well rubbed into the meat. After running the blade of a long knife between the rind and the bone on the inside of the hams, the salt could be pushed down with the aid of a stick. The dressing should be applied every other night for a fortnight to the sides, and three weeks for the hams. After being taken out they should be hung up to dry. Mr. Johns expressed his willingness to demonstrate to any of the members.

### WIRRABARA (Average annual rainfall, 18.91in.).

May 26th.—Present: 18 members.

**Stump-Jump Ploughs.**—Mr. W. Bowman, in a short paper on this subject, expressed the opinion that the plough with steel plate shares side on was the best class of implement, because one could cover twice the quantity of ground, and the shares seldom broke. Another point was that the point cut to the same depth as the wing, making a good level seedbed. That type of share enabled one to plough much harder ground, as it prevented the machine from sliding out behind. Every single-action plough should have the point of the share directly under the hinge; that would enable it to jump freely. A plough of that type would keep in the ground with a much lighter draft, because of the weight of the machine. The top pipe and spindle hinge was preferred, because it did not allow the foot to wobble. Such was not the case in older styles. A moveable draft head and lever was more easy to manipulate than one that had to be altered by unscrewing bolts. A good discussion followed.

### YACKA.

June 13th.—Present: 16 members.

**The Farm Garden.**—Mr. Forrester contributed a paper on this subject. Preparation should now be made in the manner of digging holes, &c., for the planting of fruit trees, he said. There was hardly a locality in the State in which some class of fruit could not be grown. Almonds would thrive almost anywhere, and needed very little attention. The fig tree was a reliable grower, and one of the best jams was made from its fruit. A vine or two planted around the house would produce a crop, especially if trained on a trellis. There was nothing which added more beauty or greater pleasure to the home than did a garden of fruit trees, and, circling outside of that, an avenue of gums and pines. Good discussion followed.

BELALIE NORTH, June 2nd.—Discussion took place on the Width of Tires Act. Members agreed that a lighter load did more damage to roads in winter than heavier loads in summer. Mr. Gullidge reported having harrowed portion of a paddock after rain at the time of last haymaking. Wheat sown on that during the present season came away much more quickly than that on the portion not so treated. Mr. O'Leary advised frequent harrowings, using this implement even after the wheat was up.

BLYTH, May.—Mr. W. O. Eime introduced a discussion on the mice plague. He said the problem was very serious. Discussion followed, in which Mr. McEwin advised sowing at the time in preference to delaying seeding, as the mice generally did more damage in the latter part of the season.

BLYTH, June 2nd.—A discussion on the necessity for increasing the acreage of wheat production was initiated by Mr. J. B. Turner. He read extracts which pointed out how imperative it was that farmers should produce as much wheat as possible to help to meet the heavy taxation which would be inevitable as a result of the war. An interesting discussion followed, in the course of which Mr. Buzacott and Mr. A. L. McEwin emphasized the need for increasing production.

BOOLEROO CENTRE, June 1st.—Mr. Whibley opened a discussion on the wheat best suited for this district. He spoke in favor of Federation. Mr. Nottle, sen., thought that Federation might, in time, run itself out and deteriorate. After a lengthy discussion members were unanimous that Federation was the best class of wheat for that district.

NARRIDY, June 9th.—MICE PLAGUE.—It was reported that from 30 to 40 horses had died. Mr. Loxton (veterinary surgeon) who had visited the district, attributed the loss of horses to the prevalence of mice in haystacks. Several farmers were unable to start seeding.

## LOWER-NORTH DISTRICT.

### (ADELAIDE TO FARRELL'S FLAT)

### GAWLER RIVER (Average annual rainfall, 17in. to 18in.).

June 4th.—Present: seven members.

SHEEP.—Mr. W. J. Dawkins delivered an address on the breeding ewe, her breed, care, and management. After dealing with the most suitable breed of sheep for the farmer, he mentioned that he began shearing at the end of August, as he had found that whilst several sheep may be lost whilst they were in the wool, this risk was not entailed after they had been shorn. He would put the rams with the ewes at the end of November. Two months previously they should have been provided with exercise by being put in a fallow paddock to run off surplus fat. The flock should be yarded once or twice a week from the middle of December, and the ewes breeched at the beginning of May. The flock should be inspected twice daily when lambing commenced, the ewes and lambs being drafted as they came. The lambs at the end of a fortnight were ready for tailing. It was advisable to change paddocks as often as possible, and lambs marketed should be even in type.

THE BREEDING EWE.—A short address on this subject was given by Mr. W. J. Dawkins. He thought the breed best suited for farmers was the Border Leicester half-breed ewe mated with a Dorset Horn ram, as the lambs matured very quickly. He was in favor of early shearing, beginning at the end of August. Annual dipping of sheep should be made compulsory, as it checked the damage caused by the blowfly. The rams should be put with the ewes towards the end of November, having previously had a couple of months' exercise in a fallow paddock to run off surplus fat. May was a good time to breech the ewes and keep them clean. The flock should be watched closely at lambing time, and the ewes and lambs draughted as they came. If a ewe lost a lamb it was well to let another lamb give relief to her. When a fortnight old the lambs would be fit for marking. They should be changed as often as possible into different paddocks until ready for market, when they should be picked out in even lots.

### LONE PINE.

June 5th.—Present: 25 members and four visitors.

MANAGEMENT OF THE ORCHARD.—In laying out an orchard the first consideration was the soil, said Mr. J. B. Hoffman in a paper on that subject. The soil in that district was more suitable for apricots and plums, although there were parts where apples and peaches would do well. Apples and peaches require a darker and more loamy soil to produce good fruit and good crops. An orchard should be well ploughed, well scarified, and well weeded. When planting trees the holes should be dug at least 15in. square, and 1ft. deep. A tree should never be planted deeper than it grew in the nursery. Trees should not be closer than 20ft. by 20ft., if closer it was difficult to work the land. Apricots should be grafted on apricot or peach stock, peaches on peach or almond, plums on plum, peach, apricot, or almond; on almond stock, only certain kinds of plums would do. Apricots and peach trees should be pruned every year. After having been shaped a plum tree required very little pruning. Summer pruning helped in setting fruit buds, and would spare time in winter. Summer pruning should be done as soon as the fruit was picked.

Winter pruning could be started as soon as the leaves had dropped. Sound trees and clean fruit could be obtained by making use of the spray pump. Spraying should be done just before the buds opened. In using bluestone and lime, or Bordeaux mixture, care should be taken not to make it too strong, as it would burn the fruit buds. If old apricot and peach trees were cut right back in the old wood they would produce young, healthy wood, and in a few years bear fruit again. When planting fruit trees a little bonedust added would help the tree along. If an old fruit garden did not bear too well some stable or artificial manure should be used, stable manure being by far the best. A general discussion followed the reading of the paper, in which Messrs. D. Lehmann, R. Neldner, and J. E. Minze took part.

## NORTHFIELD (Average annual rainfall, 19in.).

June 5th.—Present: 10 members.

Erecting a Stable.—This was the title of a paper given by Mr. W. J. Dall. In all cases where possible he would erect the stables facing the east, he said, preferably with stone walls and a thatched roof. That would be warm in winter and cool in summer. Although there was a danger of fire with the thatched roof, it was not so great as was the case where the stables were roofed with loose straw. The chaff shed should be situated in the centre of the stable, and allowance made for a passage way between the manger, to facilitate feeding. The floor should be paved with wood or bricks, stones being too slippery and hard. If the trough was in the stable yard, the horses would spoil the water. Conveniences for harness were made on the partition posts of the manger. An open stable was more healthy, and he preferred the horses tied up. In discussion all members favored the brick floor. Messrs. Chardon, Neely, and Chandler spoke, and expressed a preference for the stable with a loft. Mr. Neely thought the horses should be left loose, and he did not like the open style of building. Messrs. J. Eisle, Goldney, Warden, Sandercock, Cowle, and Kelley each took part in the discussion which followed.

## SALISBURY (Average annual rainfall, 18.57in.).

June 5th.—Present: six members

The Care of Vehicles.—In presenting a paper on this subject, Mr. F. W. Sayers said :—In the first place, we need sheds or buildings to suitably accommodate all our working plant. Have all things possible under cover, and not needlessly exposed to the weather. The most illused vehicles are the wagon and the tip dray. Perhaps this is owing to their being so heavy and awkward to place under cover. The life of these vehicles can be lengthened materially by applying oil, or paint, or both, to preserve the wood, and if a screw wrench be applied to the nuts a little more frequently than is usual, the wear and tear would be lessened. When anyone is in want of a new wagon (the same thing applies to any other vehicle), it is a good plan to go to a good reliable builder and have it built to order. By doing this one is assured of securing a much better article, and one most suitable for the work. Stipulate, above all things, well-seasoned timber only to be used. The whole secret lies in the timber that is used. Good well-seasoned timber costs considerably more, but we should not take too much exception to it (within reason, of course). The builder has to allow for interest on his outlay, and rent for storage. Timber for this purpose needs to be stored for a number of years, and I am of the opinion that the builder of a good reliable article deserves all he gets. As an instance, we might pay anything from £10 to £20 for a spring dray, but we must not overlook the fact that there is a vast difference in the materials used. Then, again, we must expect to pay for good workmanship. We learn by experience that the cheaper article is more likely to need repairs. We desire to secure something that will last for a number of years, and to consider not only the cost of repairs, but the loss of time in going to the builder and blacksmith. It is my intention to deal mostly with the wheels, because I contend that they are the principal wearing parts on any vehicle. I would recommend the application of at least two coats of oil on the wheels before they are painted or varnished, whichever the case might be. After being in use for a year, or perhaps two, the tyres may need cutting and shutting. In treating the wheels, instead of merely cutting and shutting the tyres, the boxes should be removed from the naves, in order that the ends of the spokes may come down as far as possible. Each spoke should be wedged at the rim to secure the proper size, in order that they each may have an equal bearing. The operation involves increased outlay, but it makes a much better wheel. Work of that character should always be done in the hottest weather, when the wood is well shrunk. When this matter has been attended to, choose dry weather, preferably hot, place your vehicle under cover, if possible in an enclosed building, thus avoiding dust. See that all dirt is removed and all roughness taken off with glasspaper and elbow grease—more of the latter than the former. Secure only sufficient fresh raw linseed oil for present requirements. If the wheels are light in weight, take them off the axles and put them on a wheel horse, or a piece of inch pipe through a post is just as effective. If heavy wheels, it is as well to block up the axles, so that they can be turned around with ease. Having the wheels ready, and some oil in a receptacle similar to a billycan, a firepot is required to keep the oil hot; but avoid, above all things, allowing it to boil. The idea in warming the oil is to make it as thin as possible, to penetrate well into the wood at the joints. If allowed to boil, it becomes stiff like varnish, and is not nearly so effective. The same thing applies to stale oil—that is, oil that has been exposed to the air. Apply the oil as quickly as possible to the spokes around the naves and felloes. Allow it to stand at least one day, then wipe off any surplus oil with a dry rag, if the wheel is a painted one. If varnished, it is as well to use a rag dipped in turps, in order not to weaken the varnish when applied. It is always a good plan to paint or varnish after oiling, insuring that no oil escapes. If this plan is resorted to at intervals of every few years, tyres should never need cutting and shutting. There will be a saving in expense, and the possession of a much more solid and reliable wheel. Another good well-known method is to place hot oil in a trough, in size according to the radius of the wheel. For small wheels a short piece of ordinary guttering, with both ends blocked, is a simple method of making a trough. When the felloes are deep and wide, a much larger one is necessary. The trough, with sufficient oil to cover the felloes, should be placed under the wheel. The wheel should be revolved, at first quickly, then slowly. This is to facilitate evenness of swelling or tightening at the joints. The spokes around the naves can be done with a brush. Although the latter method is perhaps the best, it is not nearly so economical as the first mentioned. If applied with a brush less oil is required, and is almost, if not quite, as effective. When using oil, a little applied with rag or brush to shovel handles, fork handles, and the like will not only prevent them from splitting and cracking, but will be made much nicer for handling. In painting a wagon, I would suggest mixing your own color. All that is needed for the purpose is white lead, raw or boiled oil, a little dryers or some substitute. The desired color can be obtained by adding golden ochre, umber, and sienna, all three in oil, or any other stainings to suit. The mixture will need straining through a piece of hessian. Stir the ingredients well together. Do not apply either too thickly or too thinly. Do not put too much on at one time. A little turps may be added, but use it sparingly. Turps allows the paint to work freer, but if too much is added there is a tendency to make it weak. There are several good brands of ready mixed paints on the market at the present time, but in mixing your own you know you have the genuine article, and will, in a good many instances, be more lasting. This does not apply to buggies, motor cars, or light spring drays. These being used for a much different purpose, we are apt to study appearance more than durability. Ready mixed carriage colors can be purchased, so finely and well ground, that it pays to use them. For the first coat mix your own with white lead, dry vegetable black, raw oil, and plenty of dryers and turps. Apply one or more coats of the desired finishing color that has been ground in goldsize. Thin out with turps, just thin enough to cover. The idea is to form a hard shell for the application of the varnish. If you can use a lining brush, a few lines make an improvement, and finally varnish one coat. It is a mistake to apply more, unless, of course, by a tradesman, because you are apt to get too much on, and the result may be blisters. After allowing to stand a few days, get a bucket of rain water and a good chamois leather, and wash well before being used. This is a point well worth noting. By washing with clean water, and drying with a chamois, the varnish is hardened, and the dust off the road falls off instead of sticking, as is very often the case. Never wash a vehicle unless you dry off well with a chamois, and never allow mud or dirt to remain on too long. Use plenty of water. I have always found that the more you wash varnish that is exposed to the weather the longer and better it will keep its shine. Varnished wood should be rubbed flat or dead before applying varnish. This is easily accomplished by rubbing down with ground pumice on a piece of an old felt hat dipped in water. This will remove all grease, &c., and takes off any shine, and prevents to a very large extent the varnish from running. Exercise the greatest care in not applying too much. Use only the best of materials. It pays.

LYNDOCH, May 31st.—A paper dealing with the question of noxious weeds was contributed by Mr. W. Burge, who dealt with various useless weeds found in the State, and emphasized the necessity for stricter enforcement of legislation dealing with this matter. Members generally agreed with the opinions expressed by the writer of the paper.

MALLALA, June 4th.—BULK HANDLING OF WHEAT.—Mr. A. V. Nairn initiated a discussion on this question.

WATERVALE, June 9th.—MICE PLAGUE.—This subject was discussed by members, who thought much loss could be saved if good stacking accommodation were provided at stations.

## YORKE PENINSULA DISTRICT.

### (TO BUTE.)

### MOONTA (Average annual rainfall, 15.22in.).

June 2nd.—Present: 14 members and one visitor.

FALLOWING.—Mr. Hartley Cadd, in a paper under this heading, said with the heavier type of land fallowing should be started immediately seeding was finished, the land being ploughed to a depth of at least 4in. As soon as the ploughing was finished the land should be cross-harrowed with fairly heavy, well-sharpened harrows twice. When the weeds showed up nicely a cultivator or skim plough should be put on; if the latter were used the mouldboards should be removed. The cultivator, or plough should be put to the full depth of the ploughing. Later, when the ground showed signs of crusting the harrows should again be put on. If good spring rains were experienced a second crop of weeds would present themselves. These should be cut off lightly with a skim plough with the mouldboards removed, care being taken not to do the work when the ground was dry. Again, if the surface caked the harrows should be put on. The result aimed at in fallowing was conservation of moisture and germination of weed seeds. If the job were properly done both ends were gained. Care should at all times be taken not to work the land when it was at all boggy, or when dry. It was difficult to fallow sandy land without causing it to drift, thereby spoiling the land itself as well as the fences, roads, &c. Grass and stubble should not be burnt off, but as much as possible should be ploughed in. To do that properly a disk plough was necessary. The fallow land should not be touched until the weeds had grown up well, when it should be lightly ploughed, but even then only when the land was nice and moist. Nothing more should be done, and sheep should be put on as little as possible. With that land care must be taken never to work it when at all on the dry side. Mr. A. B. Ferguson agreed that fallowing should be commenced immediately after seeding, but did not favor keeping the sheep off fallowed sand. If the ground were ploughed when in a very wet state, sheep would pack it down. He would fallow just sufficiently deep to cut the weeds and turn them over, and preferred the spring tooth cultivator, or the skim plough with the mouldboard removed to work the fallow. The harrows constituted one of the most profitable implements on the farm when used at the right time. The scraper should be used by every ploughman. Mr. W. B. Stacey preferred the potato mouldboard rather than no mouldboard for working the fallow. Mr. H. J. Cadd suggested sowing peas or oats for feed on fallowed sandhills. If the sandhills were not cultivated after being fallowed it would be a much wiser plan to leave them undisturbed.

## WESTERN DISTRICT.

### BUTLER (Average annual rainfall, 16.61in.).

June 4th.—Present: 12 members and six visitors.

Homestead Meeting.—Mr. R. W. Phillis opened a discussion on tree planting. He thought sugar gums were best suited for the district. Mr. R. Barr was in favor of fruit trees, as besides affording shelter for stock, they could be turned to household uses, but should be fenced off to keep stock from destroying them. Mr. S. Bawden said it was not convenient for every farmer to fence trees owing to the high cost of materials. Mr. A. Hughes had planted gum trees in the corner of paddocks which he thought solved the fencing problem. Mr. G. W. Bray also had good results from gum trees. Mr. J. Owen had grown many varieties of trees from seed, including sugar and blue gums, pepper, &c. The best method was to get some old jam tins with the bottoms out, and stand them together on an old sheet of iron in order to prevent the roots from entering the ground. Then sift soil over the tins until they were well covered, drop three or four seeds into each tin, and sprinkle a little more soil over them. Sow the seeds in February, and to protect the young plants from hot winds and sun it was well to shelter them with old pieces of bagging to act as a breakwind. When the second pair of leaves appeared thin the young plants out, leaving only one in each tin, either the strongest or most central. The best time for planting out was June or July. The land should be well grubbed, and the exact site of each tree loosened with a pick, then place the tree in the ground without removing the tin.

Discussion on Fallowing.—Mr. D. B. Butler said it would pay to put less crop in rather than miss the opportunity to commence early fallowing. He favored the share plough, as it took more stumps from the land. Mr. A. H. Pfitzner spoke in favor of the disk implement. He contended that most of the inferior work done by the disk plough was due to neglect on the part of the ploughman. Mr. A. Hughes believed in early fallowing, but did not advise deep ploughing. Mr. G. W. Bray said in wet seasons he would fallow to a depth of 3in., and work back in September, late fallow should be ploughed shallower. Mr. C. Z. Jericho favored seeding in June and fallowing during July and August, doing all one could to keep the land free of stumps and stones.

### CUMMINS.

June 2nd.

Poultry.—Mr. W. Blucher contributed a paper on this subject, in the course of which he stated that eggs at 6d. per dozen were more profitable than butter at 1s. per lb. Each farm should carry 150 head of poultry of pure breed. He then gave a few points dealing with the question of breeding, and advised hatching chickens between July and the middle of October. As there was only a small market for table poultry in that district he advised paying attention to the laying strains of fowls, suggesting the Leghorns and Minorcas as suitable breeds.

### ELBOW HILL (Average annual rainfall, 11in. to 12in.).

June 2nd.—Present: 14 members.

State Flour Mills.—The Hon. Secretary (Mr. H. J. Wheeler) in discussing the subject of State flour mills in a short paper, said, "Australia being a producing country, one of the most important questions is the disposing of her products. The great difficulty in the producers' light is the distance from the markets of the world. At the present time the cost of marketing overseas amounts to nearly as much as the producer receives. Thus he only receives about half of the price the consumer pays for the produce. We pay enormous freights to have our wheat lifted to oversea markets, when it could be gristed here, and the flour exported. Australian flour can command a ready sale, and by shipping flour instead of wheat 20 per cent. to 30 per cent. of the shipping space would be saved. We would retain the mill offal in the country to feed stock. The producer pays high prices for the bran and pollard of his own growing, because he sends the bulk of these commodities to other countries. to cheapen their value there. State flour mills would provide labor for all time, have the result of circulating more money in Australia, and tend towards a more direct exchange of foodstuffs. To take up a universal system of gristing we must have a working scheme. While it is not essential that this should be taken over solely by the Government, the Government should advance, foster, and protect the industry. Money should be available from the Government to bodies of producers for the purpose of starting mills under Government supervision until paid for, in all ports that can show an average of 150,000bush. of wheat per year for a period of five years, providing a sufficient number of applicants guarantee to support the mills with 75 per cent. of saleable wheat. All wheat would be gristed on a "per bushel" basis, and the flour would be pooled, while the farmer would, at his option, retain part or all of the offal. Mr. G. C. Dunn expressed the view that wheat could be exported more profitably than flour. Mr. T. Wildman favored a State system of gristing. Mr. R. T. Mills approved of State-assisted flour mills. He thought the prices of bran and pollard ruling at present were too high, and State mills would reduce the prices, and so make it possible for the farmer to feed bran and pollard to his stock with profit. Messrs. G. F. Wake, A. C. Dawkins, and J. V. Wake disapproved of State-owned mills.

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## MILTALIE (Average annual rainfall, 14.55in.).

June 2nd.—Present: eight members.

**By-products of the Farm.**—In a short paper dealing with this subject Mr. Story said first to be considered was the keeping of a few sheep, which could easily be looked after, and were a reliable source of income. Cows were profitable, provided one was able to look after the number kept. Fowls and pigs did not require very much attention, and besides providing food, could also be turned to monetary account. In discussing the paper Mr. H. R. Jacobs favored sheep as being the most profitable sideline. Mr. T. J. P. McEachen considered that poultry were most remunerative. Mr. J. W. Story thought cows, pigs, and poultry were a source of revenue in many ways. Besides being available for sale they provided food for the household. Mr. E. Story gave preference to cows and raising calves, but would also keep sheep, pigs, and poultry. The Hon. Secretary (Mr. W. E. Hier) considered poultry as being most profitable, but did not advise keeping ducks. Mr. J. Aunger spoke in favor of pigs, but he thought it unwise to house them far away from the homestead, as time was wasted in that manner.

## MINNIPA.—June 2nd.

**Ensilage.**—Dealing with this subject in a short paper, Mr. A. Elefson mentioned that green stuff preserved in the shape of ensilage was of considerable value as a standby in the winter months. It kept stock in good condition, and maintained the milk supply. Any green stuff that the stock would eat could be preserved in this manner, either in underground silos or in the shape of a stack. In the course of the discussion, it was mentioned that properly cured ensilage was less weighty than the same bulk of material grown, and also that there was a greater proportionate loss on the stack of ensilage than from a stack of hay.

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## SALT CREEK.

June 2nd.—Present: 12 members and two visitors.

**Skim Cultivator v. Plough.**—In dealing with this subject, Mr. George Barber said he had found the 12-furrow cultivator plough a more successful implement than the six-furrow plough. The latter had a tendency to turn up the earth and leave it very rough, which hindered the harrows from making a good clean job, whereas the cultivator, with 7in. shares, would cut the ground and leave it close and even, thus encouraging weed seeds to germinate. He found the harrows did better work after the cultivator. Seeing that the land was cultivated three times before seeding, it was unnecessary to use a heavier implement when a lighter one did the work equally as well. The land appeared to hold moisture better after the cultivator, as the plough left the work too open. Especially where the land was very dirty, and needed a good deal of working, was the cultivator most successful. Good discussion followed, in which members generally agreed with the speaker. Mr. Barber asked if anyone had experience with the drill attachment on the plough? Members replied that only on level ground were the attachments a success.

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## YADNARIE (Average annual rainfall, 14.09in.).

June 2nd.—Present: seven members and two visitors.

**Hints for Employers.**—In a short paper on this subject, Mr. G. E. Kruger said one of the main causes of the difficulty in obtaining farm labor was the want of a better understanding between master and man. Some employers would have their men working at all hours and in all weathers. Employers should treat their employees as they would like to be treated were the positions reversed. Bad treatment and the lack of good accommodation tended to make farm labor scarce, which necessitated high wages. A half-holiday given to the men occasionally during the slack season would be well repaid in harvest and seeding operations. Members in discussion unanimously agreed that employers would get better results if the men were better cared for.

BUTLER, April 30th.—HOMESTEAD MEETING.—Mr. Spafford gave an interesting address on the subject of soil cultivation and manuring.

KOONIBBA, June 7th.—The Hon. Secretary (Mr. E. O. Dahl) read an extract dealing with certain classes of wheat grown in Victoria. Several kinds of wheat were named as being frost-resisting, and it was resolved to ascertain if such wheats were obtainable from any of the experimental farms in this State.

PENONG, June 9th.—A general discussion took place on the prevention of smut in wheat, as a result of extracts being read by the Hon. Secretary (Mr. O. J. Murphy). Mr. Stiggants mentioned that seed sown by a broadcasting machine was less likely to be affected by smut than seed sown through a drill, probably because the latter machine tended to break up any "bunt" balls in the seed. He also stated that affected seed, sown by a broadcaster, which had lain on the ground three or four days before being covered, frequently produced a cleaner crop than seed covered immediately after sowing, especially in damp weather.

## EASTERN DISTRICT.

### (EAST OF MOUNT LOFTY RANGES.)

### BORRIKA.

June 2nd.—Present: 15 members and three visitors.

QUESTION BOX: ANNUAL MEETING.—Various questions were discussed. Mr. Huxtable said barley was very liable to smut, and advised members to pickle before sowing. Opinions were divided as to the quantity of oats to be sown per acre. Mr. Hart had sown 50lbs. to 60lbs. of super. to the acre, and then altered to 100lbs., and had not noticed any marked difference, but Mr. Green disagreed. Mr. Bonython favored pickle mixed at the rate of 1lb. of bluestone to 10galls. of water, which gave good results. The Hon. Secretary (Mr. O. F. Bauerochse) then read the annual report. The previous meeting also took the form of a "Question Box," and good discussion on various topics took place. The likelihood of the development of takeall after the ploughing under of stubble for fallow, the use of drake as a fodder, the pickling of oats, and the question of rotation of crops, were debated at length.

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### MONARTO SOUTH (Average annual rainfall, 14in. to 15in.).

June 2nd.

SKINS AND HIDES.—The Chairman (Mr. G. Patterson) contributed a paper on the care of skins and hides. He said, "If skinning a cow or bullock, avoid cutting the skin, as every cut that is made in the hide detracts from its selling value. When the hide is taken off it is a good plan to spread it on the barn floor or some other suitable place. After being salted and left over night, it can be rolled, put in a bag, and marketed. Coarse salt is satisfactory for hides, and it is much cheaper than table salt. Care should be taken in skinning sheep. After opening up, use the knife as little as possible in taking off the skin. Leave the trotters on, as they help to stretch it into a better shape while drying. Cuts lessen the value of the sheepskin. When the skin is taken off, it should be thrown lengthwise over a straight thin rail or tight wire under a shed. Under cover, skins dry more slowly. If they are hanging over a rail, as suggested, if desired, one could tie the trotters together, and put another piece of wood through as a weight, which would help in stretching the skin. If kept any length of time the skins should be painted over with a wash to prevent weevil getting into them. Never throw skins one on top of another, as that seems to encourage the weevil to attack the skins. Never hang them on a wire fence to dry.''

## PINNAROO (Average annual rainfall, 16.74in.).

June 1st.—Present: 18 members and two visitors.

Keeping Farm Accounts.—Mr. F. G. Bonnin supplied a paper dealing with the subject of farm bookkeeping. He said :—''Before reading this paper, I wish it to be clearly understood that I am not, by any means, an expert bookkeeper myself, and can therefore only attempt to give you an outline of the methods I employ, and which I have found very satisfactory so far, and which I think can be modified, as circumstances suggest, to suit almost any requirements of an agriculturist. There may, however, be many other methods equally good, and perhaps better than mine; but I am forced to confine myself to the ones of which I have some slight knowledge. Let me say here that no one can possibly hope to become an adept at keeping accounts without a considerable amount of experience and practice. To the beginner, as a rule, the work is somewhat muddling; but after some time has been devoted to it, he will grasp the reason for things much more easily than he could at the start, and will be able to reason out any problems he may meet, if he apply commonsense and a little patience. The method of bookkeeping I use for the money side of the business is known as the ''double entry'' system, and for it two books are necessary, a journal, or day book, and ledger. A separate cashbook may be kept in conjunction with them, if so desired, but is not essential. The day book is in reality a memorandum of all moneys received and spent, and it shows to which accounts they must be subsequently entered in the ledger. This book must be kept up to date at all times, otherwise mistakes and omissions will creep in, and render the work practically useless. Once an entry is made in the day book it is safe, and can be posted up in the ledger at any convenient time. All cheques drawn are listed in the day book, being copied in from the heels of the cheque book. The ledger contains my own private accounts, and also the accounts of the various firms and persons with whom I have any dealings, and to keep it correctly there is one thing that must always be remembered, and it is this, that for every credit shown on one side there must be a corresponding debit shown somewhere in the ledger on the other side. If this rule is carefully followed, the books will always be found correct, and the accounts will balance. My own private accounts, which are all debtor accounts, show all disbursements of money on the farm, grouped under different headings, which I have divided up and named to suit my own requirements, and also to fit in with those of the income tax returns, and so save time and trouble when they have to be made up each year. For instance, take the house account, which includes all living expenses. This shows at a glance how much has been spent on the housekeeping over any required period, all the various storekeepers' accounts for food, &c., being grouped together on this page of the ledger. Then we might consider the wages account, which records how much money has been expended in wages over any given time, and also to whom the payments have been made. Other accounts appearing in my books are plant account, stock account, seeding account, harvest account, freight account, fodder account, and so on, each showing the various items of expenditure under their own particular headings. The number of these private accounts can be increased indefinitely to suit individual needs, but the greater the number of accounts the more work required in keeping them. It is therefore a great advantage to keep the number as small as possible without detracting from the usefulness of the work. To try and make plainer the way in which the accounts go through the books, I have set down two examples. Suppose William Smith has worked 10 weeks for me at £1 per week, the entry in my day book would appear as follows:—Wages account to W. Smith—10 weeks at 20s., £10. That means that I debit my wages account in the ledger with £10, and credit W. Smith's account with £10 for work done. When I pay Smith a cheque for £10, it is debited to his account, which at once balances, showing £10 on each side. The way in which the wages account will balance, if desired, I will endeavor to explain a little further on. As another example to show how a storekeeper's account may be split in my ledger, I have taken the following figures. Say I go to Brown & Co.'s store and buy the following goods:—1 bag flour (house account), £1; 1 bag bran (fodder account), 10s.; 1cwt. wire (fencing account), £1 10s.; 100 cornsacks (harvest account), £5. The entry appears in the day book as follows:—

Sundry Accounts to Brown & Co.

| | £ | s. | d. |
|---|---|---|---|
| House Account—1 bag flour | 1 | 0 | 0 |
| Fodder Account—1 bag bran | 0 | 10 | 0 |
| Fencing Account—1cwt. wire | 1 | 10 | 0 |
| Harvest Account—100 cornsacks | 5 | 0 | 0 |
| | 8 | 0 | 0 |

Each item is debited to its own account in the ledger, and Brown & Co.'s account is credited with £8 in a lump sum for goods supplied. As soon as I pay the cheque for £8, Brown & Co.'s account is debited with it, the account balancing. In conjunction with the afore-mentioned accounts, I keep a cash account for small amounts not paid by cheque, and also a bank account, in which all moneys paid in are debited to the banks, and all cheques drawn are credited to it. I said before that all my private accounts are debtor accounts, *i.e.*, they show on one side only of the ledger. To balance these accounts, if it is desired, a general account is used. In the general account, all the various debtor accounts are shown together on the debit side of the ledger, and the cheques drawn in paying the different accounts go down on the opposite side, and if all entries are correct, the amounts must, of course, balance each other. I keep also a produce account, in which I show all sales of grain, hay, stock, and dairy produce, &c., this account being all credits. I could write a great deal more on this part of the subject, but time would not permit, and I am doubtful if I would make it any clearer; one must have had practice to thoroughly grasp it. Besides the money side of the books, I keep a diary, in which I note down what I and my men are doing each day. By doing this, I can at any time get the exact cost of any particular piece of work should I so desire. At seeding time I record the number of acres drilled each day, and also the quantity and variety of seed being sown, and the amount of super. being put on per acre. Then, at harvest time, I keep careful count of all bags of grain, and show the number of bags in each wagonload, the weight of same, and to whom it was delivered. I also make a note, after cleaning up, of how much each particular crop and paddock yielded. I make all these notes on the blank pages at the end of the diary. I also jot down in the diary the dates on which each man I employ started and finished working for me, together with rate of wages being paid. I think it advisable also to set down the history of each paddock or piece of land cropped on the farm each year. If the paddocks are permanently fenced off this is easily done in a special note book kept for the purpose. In new land, however, where fences are only temporary, and sometimes shifted, I find it very handy to make a small plan of the block each year, showing the situation of the various paddocks at the time, and how they were worked, whether under crop of some kind, fallow, or pasture land. The ploughing, drilling, and reaping dates can be shown on this, if desired. It is advisable to keep lists of all stock on the farm, and to show the dates on which numbers are increased or decreased, and also to put down the dates when female stock are served by the male, and when the young are dropped. That concludes the list of records which I keep myself, but it can, of course, be added to at any time as seems necessary. In conclusion, I would say that every farmer should keep books, so that he can at all times get at his exact position financially, and also save endless confusion in making up Government returns, which are becoming more numerous and more complicated each year. Let it be remembered that bookkeeping, to be of any value, must be accurate, and therefore my advice is—Leave nothing to chance, and trust nothing to memory; get every transaction down in black and white as soon as it is completed. This applies very particularly to all money matters, which are always the greatest source of error if not kept right up to date.''—Mr. P. J. Edwards (Chairman) emphasized the wisdom of recording matter in a diary. Mr. E. H. Parsons advocated the paying of all accounts by cheque, and that to order; by that means one was less liable to lose sight of debits. Mr. T. B. Shiels remarked that the system as outlined by the writer would be most up to date in many business houses, and if carried out on all farms the farmers would be the better able to locate their financial position. One item overlooked by the writer was the taking of stock each year; that would require the opening of a "Capital account," which would set out the value of plant, *i.e.*, after making due allowance for depreciation by wear and tear, the reduced value of livestock, &c. Mr. McIntosh kept various farmers' accounts, and he thought the scheme as suggested in the paper, from an accountant's standpoint, would work admirably for the most complicated of farms. He would not advise anybody to do without a cash book. That could be made a book of valuable records, and if ruled in a proper way would indicate at a glance the state of accounts. He urged all farmers to keep a record of wheat deliveries.

## POMPOOTA.

May 23rd.—Present: 35 members.

Citrus Culture.—In dealing with this subject in a paper, Mr. H. J. Darwent (Fruit Inspector) said:—"In those parts of the State exposed to high winds and frost, the question of the site for the citrus grower is very important, and the orchard should be planted in the best protected position. High winds can, to a great extent, be overcome by planting windbreaks, but frost is far more difficult to combat. Lowlying spots should be avoided, as it is well known that cold air always finds its way to the lowest part, and it is there that we find most damage done. The best position is one having an eastern aspect, where the sun is upon it as soon as it rises. Trees hidden from the sun until it is up long enough to attain a considerable heat are most damaged after frosty weather. If it is not possible to secure an eastern aspect, select a place on sloping ground, and avoid planting in the lowest part. Provided there are no obstacles to the free passage of air, then the cold air will drain away to those lower parts. Rich alluvial soils having good drainage are admirably adapted to the growth of citrus trees, and they also do equally well in the deep sandy loams, provided the drainage is good. The question of drainage in regard to the growing of citrus fruits, and in fact, all other fruits, is of paramount importance. It guards against the accumulation of injurious salts in the soil, and allows of proper aeration, thereby allowing the roots to penetrate deeper. Should hard pan be met with it is useless trying to grow citrus trees unless it is completely broken up by the use of explosives. It is better still to plant such land with some other variety of fruit tree, though the use of explosives must then be resorted to if success is to be attained. Assuming that the site selected for the grove has been grubbed and cleared, the next thing is the ploughing and grading. The work of putting down the irrigation channels is done by the Irrigation Department, and, as it is one of great importance, should be left to them in preference to the grower doing it himself. After the channels are completed it would be advantageous to put the water on the land in order that any little unevenness in the grading may be rectified. The channels should be laid down so that the rows of trees to be watered should not be longer than about six chains, otherwise it will be found that by the time the water reaches the end of the row those trees nearest the channel will have had too much water. This is the main cause of seepage. Pegging out the grove is much more important than would seem to the uninitiated. After the channels are laid down, and prior to pegging out the land, a cover crop of oats or wheat should be sown to prevent the sand drift, but the marking out of the land should be completed before the crop grows to a height which will interfere with the work. As in all work of this kind it is necessary that a base from which to work should be found—this is our first consideration. If we were planting fruit trees where no irrigation is to be done, it is a simple matter to use one of our boundaries, but on land which is to be irrigated, it is necessary to find the suitable grade along which to run the water, and there put down our line which will be the base from which we must work. The grade along the rows of trees to be watered must be neither too great nor too little. In the former case it causes washing of the soil, and in the latter the trees at the far end of the row cannot get enough moisture without overwatering those near the channel. In no case should the grade be more than 30in. or less than 24in. per five chains in this soil. Having found the desired fall or grade, we may proceed to peg out the land for planting. A wire line with the distances carefully marked by placing solder on it should be drawn across the block where the grade has been found, and a stake driven in at each mark on the line. We now have the base from which to work. Another line with the distances of the rows apart should now be drawn parallel with the channel, and stakes driven at each mark. It is a simple matter to then draw the two lines on the opposite sides to where we have used them, and so mark out the square or oblong block, after which one line may be drawn across between the pegs on opposite sides, and the stakes put in at each mark. The trees should be planted not less than 22ft. apart on the square system. This distance allows of 90 trees being planted per acre. Twenty-five to 30ft. should be allowed for headlands. Care should be taken when planting the trees that a space of several feet round each tree be kept clear of the cover crop, so that the trees will not be robbed of moisture during the summer. Should the crop not be sown before the land is pegged out it must be drilled in between the rows of stakes so that the young trees may have shelter as soon as they are planted. A reliable nurseryman should be selected to supply the trees, and another important point is to place the order early to avoid disappointment, and so that good trees may be secured. They should be two years old from budding, and the wood should be well matured. The best stock for these areas is seedling sweet orange if the drainage is good. The best varieties are:—Oranges (Navels) Washington, Thompson's Improved, and Navelencia; other than navels, Joppa, Mediterranean Sweet, Parker's Seedling, and Valencia Late. Mandarins, Dancy's Tangierine, Beauty of Glen Retreat, Emperor, and Scarlet. Lemons—Lisbon, Villa Franca. In planning the orchard the citrus trees should be planted on the top of the slope, provided the soil conditions mentioned previously are found there, stone fruits coming next, and pears in the lowest part, as they stand best the greater amount of moisture, which gravitates to the lower parts of the block. Spring is the best time to plant citrus trees, owing to there being less liability to damage from frost at that time. The first appearance of activity in the buds determines the exact time to start planting operations, so that the trees will receive no check. If growth has started, then the moving of the trees is bound to give them a check. The holes must be at least 2ft. 6in. square, and loosened to a depth of 18in. to 2ft. Should the soil be stiff after loosening to this depth, then explosives must be used to break up the subsoil, but such soil is not suitable for citrus growing. A planting board is used both for digging the holes and planting. It has a notch cut in the centre and one at each end. When digging the hole place the centre notch over the peg where the tree is to go, and while it is in position put a peg in at each notch at the ends. Remove the board and dig the hole. When planting place the board across the hole, having the notches at the end over the two pegs put in. The notch in the centre then indicates the right position for the tree to be planted. After planting the trees tie a handful of straw or grass loosely round the stems to prevent damage from the sun. Bundles gathered from the cover crop will do for this purpose. The young trees should be kept moist right through the summer. *Cultivation.*—In early winter the land should be deeply cultivated, but instead of working it down to a fine even surface, allow it to remain in a rough state, so that it will be thoroughly aerated and sweetened. Deep working also allows the manures to be placed well down in the soil. Spring cultivation on the other hand is comparatively shallow, being sufficient to bury weeds which grow. A good plan is to grow some crop between the trees which will increase the nitrogen in the soil, and turn it in, thus enriching the land at the same time as cultivating it. It is not always advisable to turn the crop in while in the green state. Allow it to become dry and partially rotted before ploughing it under, otherwise the acidity of the soil will be increased. During the summer the land requires to be well worked to maintain a layer of finely-worked soil on the top, thus breaking up the capilliary tubes and conserving the moisture as much as possible. Of course while the trees are young it is necessary to have strips of some cover crop growing between the rows to protect them. Thus this summer cultivation can only be carried out on strips on each side of the trees, the cultivation extending farther from the trees as they get older, until the trees can shelter themselves. *Irrigation.*—Deep cultivation and deep irrigation furrows will do much towards exploding the mistaken idea that the citrus tree is shallow-rooted. If the moisture is only given to the surface soil, then it stands to reason that the roots will come up after it, and *vice versa.* Many object to deep cultivation on the score of damage being done to the roots. The surface roots of citrus repair damage done them by cutting with the plough quicker than any other tree, but providing the trees are planted in suitable soil, and cultivated and irrigated with the object of sending the roots down, then there is not much need to fear. Of course, if the soil is shallow, and the roots cannot penetrate deeply, it would be madness to continue cutting roots ruthlessly. The irrigation of a citrus grove is largely determined by the soil conditions, and subsequent cultivation. It is essential that an even supply of moisture should be maintained about the roots, and this can only be done by constantly testing, and never allowing the soil to become dry enough to cause the trees to wilt. Over irrigation will result in seepage, and the accumulation of salts in the lower portions of the grove, and it is just as important to guard against it, as not giving the trees enough water. The accumulation of salt may not be noticed for some time, but in dry years, when the evaporation is great, the salts held in the water in solution gradually rise as the evaporation takes place, and are concentrated in the surface layers of the soil. This may be guarded against by deep preparation of the soil when breaking up the land, and the maintenance of a deep layer of thoroughly cultivated soil during the hot season, or the growing of crops which shade the ground from the sun. All water applied to the land in irrigation contains salt, and, though it may not be sufficient to cause damage in one season, unless we provide protective measures, it is only a question of time before it impregnates the soil to such an extent as to cause serious damage to trees or crops growing on the land. During the wet season this salt is taken deeply down into the soil, only to rise with evaporation unless we can counteract it as stated above. If not, it will be necessary to put down underground drains, and though the first expense may seem large, there is little doubt but that it will amply repay the grower for his outlay as well as make a permanent provision against damage from salt. Care is required in irrigating in late autumn that forced growth may not be immature by the time the first frosts are experienced, otherwise much damage may be caused, and so it is sometimes necessary to steady the growth by withholding the water. Apply the water in deep trenches or furrows, and as soon after as the condition of the soil will allow, break up the bottom and sides of the furrows completely, so as to prevent loss of moisture. Then continue the cultivation to bring about a fine, dry tilth on the top of the grove. Soil conditions and the treatment the orchard receives between times will determine how often it needs irrigation. Sandy soils with good drainage require more frequent waterings than heavy retentive soils. *Pruning.*—The pruning of the citrus tree during its early stages is of a very light character. The lower branches may be used to protect the stem of the tree, and shade the ground from the sun, it being only necessary to remove them when they interfere with the working of the ground. Of course a clear stem of about 1ft. should be kept. Any limbs crossing others in better positions should be removed, and also any dead shoots which may appear. This latter is very rare in young trees properly cared for. Prune in early spring, as the growth sent out after the operation will cover the gaps and shelter the tree from the heat of summer. Pruning in autumn is liable to cause late growth, which is susceptible to damage by frost. Make all cuts smooth and close to the limb from which the branch is severed, to facilitate healing. Young citrus trees require manuring, which will tend to promote growth, and so require a liberal supply of nitrogenous manures. Nitrogen, in places like Pompoota, is always deficient in the soil, and the benefit derived from the fertilisers used may be greatly augmented by the growing of leguminous cover crops between the trees, and so serve a double purpose—the fertilising of the soil and increasing the humus in the soil. Humus is much slower accumulating in sandy soils than in heavier soils in colder climates. Humus is valuable because it forms the food of nitrogen-forming bacteria, which convert it into nitric acid, the form of nitrogen which is the food of citrus trees. Humus also increases the water-holding capacity of soils, and causes sandy soils to retain moisture longer. It also prevents the heavy soils becoming water-logged, as it does not allow the clay to become compact, and it prevents washing of the soil in heavy rains. There are two classes of cover crops—those which gather nitrogen, and those which consume it. In the first we may include all leguminous plants, such as peas, beans, clover, tares, lucerne, and others; in the second may be included wheat, oats, barley, rye, and grasses. If the roots of the former be examined, on them will be found nodules formed by the bacteria which enter the roots. The nodules decay and shrivel, and their nitrogen contents are taken up by the roots of the trees. The second class of cover crops increase the humus in the soil, but only return the nitrogen which they remove. They are useful, in that they have the effect of keeping the soil open. Citrus trees benefit at all stages from the application of phosphatic manures. As the trees come into bearing the amount of nitrogen supplied should be smaller, otherwise the tree will produce wood at the expense of the crop. It is now that potash should be included in the fertilisers used, to aid in the fruiting. It also improves the flavor, and the fruit keeps much better. These three important fertilisers, nitrogen, phosphoric acid, and potash are generally found to be deficient in the soils in which citrus trees are grown in the valley of the Murray. In addition to the leguminous crops mentioned above, blood manures and sulphate of ammonia will supply nitrogen; bonedust and bone super. are best for phosphoric acid; while sulphate of potash is the form of this fertiliser which will be found best. Supply phosphates and potash with the early winter cultivation, and nitrogen with the spring working. The amount of the fertilisers will vary with the age of the trees, but more bonedust must be added than any of the others, owing to its not being so readily soluble. Bone super. is beneficial if used with the bonedust, as it is so much sooner available for the trees. *Pests and Diseases.*—The most serious insect pest known to growers of citrus trees in this State is the red scale of the orange (*Aspidiotus aurantii*). Fortunately this pest has not, so far, made its appearance on the Murray, and it is only by strict inspection of trees and fruit being sent to the river settlements that it can be prevented from gaining a foothold there. The most successful treatment is found to be fumigation with hydrocyanic acid gas beneath gastight tents, the best time for carrying out the operation being during the winter months, while the insects are dormant. For a space of 150 cubic feet use 1oz. of cyanide of potassium (98 per cent.), 1oz. of sulphuric acid, and 3ozs. of soft water. Use earthenware jars, and place the water and acid in the jar. When the bottom of the tent has been covered all round with earth, except for leaving enough room for the operator to get under, then add the cyanide *in lump form,* get out as soon as possible, and cover the remainder of the tent on the ground with soil. Allow at least three-quarters of an hour before removing the tent. The work must only be done at night or on a dull, cloudy day. It is necessary that great care should be taken in handling the chemicals, as they are extremely poisonous. Spraying with red oil emulsion is being used in some groves with varying success. No reliable tests have yet been made which will justify one in recommending the exclusive use of these oil sprays, though should it be proved that they are efficacious then the cost of combating this pest would be light, and the work much easier done. The black scale (*Lecanium oleae*) is more easily dealt with, the red oil emulsion being very effective. The trees are made unsightly by the black sooty mould fungus, which is always found where this scale is on the trees. The sooty mould is not caused directly by the scale, but is a fungus which thrives on the sweet excreta of the scale. It is usually found on trees with thick foliage, and it is necessary to thin out the trees before spraying. This will always apply to citrus trees when spraying for any pest, so that every part of the trees can be thoroughly drenched. The curculio beetle (*Otiorrhynchus cribricollis*) does a lot of damage to young trees of all kinds. As it only appears at night, growers who are not acquainted with its habits are often at a loss to know what is doing the damage to the trees. They may be found during the daytime just under the top soil layer, or if a bandage is placed round the stem of the tree they will take shelter under it. They are small brown beetles about a quarter of an inch long. They eat the young leaves and shoots, thus retarding the growth of the trees. Various traps for catching these weevils have been used with success. During the last summer the young cherry trees at the Blackwood Experimental Orchard were almost denuded of foliage by them. They were sprayed with 1lb. of arsenate of lead dissolved in 6galls. of water. The trees and ground were made white by the mixture, and next day the beetles could be seen lying dead under the trees in hundreds. Citrus trees are subject to many fungus diseases, but if taken in time and properly attended to, there is not much to fear in the climate experienced on the Murray. One of these diseases, *Ascochyta corticola,* known as lemon bark blotch, has been found at Pompoota during the past summer; no doubt it was introduced with the trees. All affected trees should have the affected spots cut away and the stems painted with Bordeaux mixture, using the winter strength. Any trees so badly attacked as to be almost girdled, should be taken up and burned. The collar rot fungus (*Fusarium limonis*) is causing losses in some parts of the State, particularly in stiff soils. The treatment is similar to that mentioned above. Citrus growing, like any other branch of horticulture, is a business which reflects the intelligence and industry of those engaged in it in a remarkable manner. Given proper attention these trees show the result as markedly as any other fruit tree, while if neglected they suffer more. And so it is useless for anyone to engage in such an industry unless he is prepared to work hard and intelligently, leaving nothing to chance.''

## POMPOOTA.

May 30th.—Present: 40 members.

**Onion Growing.**—In a paper dealing with this subject Mr. M. O'Callaghan stated that given proper treatment there were few localities in which onions would fail to grow. A favored spot was a hill or rise receiving the morning sun. The land should be ploughed deeply; harrowed well to break all clods, then rolled in the same direction as the furrows. The finer the soil the easier the hoeing and weeding. The time of sowing varied slightly, according to the district, but Early Globe could be sown from April to June, Brown Globe from May to June, Brown Spanish July to September. Seed should be drilled in 9in. or 10in. apart, and 1in. deep; 4lbs. to 6lbs. of seed were required to drill one acre. When sowing was completed it was well to run light harrows over to cover any seed that was too near the surface. Stiff soils and soils deficient in fertility could be greatly improved by the cultivation of one or more crops previous to planting onions. Carrots were said to be the most desirable crop to precede onions. The onion required a liberal amount of plant food in the most available form. The most expensive item in onion growing was labor. The cost of labor was just as great for a crop of five tons as for 10 tons, therefore it payed to be liberal in the use of fertilizers. It was better to manure one acre thoroughly than two sparingly. A 10-ton crop removed 30.24lbs. of nitrogen, 10.31lbs. phosphoric acid, and 23.41lbs. potash from the soil. The chief tool required for the process of soil stirring was a good hand wheel hoe, such as a Planet Junior. It was absolutely indispensable. Cultivation should begin as soon as the plants showed, be repeated whenever the least sign of a crust appeared. An acre could be gone over by one person in a day. It was well to begin with a double wheel hoe, changing to a single as season advanced. Next came hand weeding, when weeds were visible. That should be repeated as often as necessary. At the second or third weeding pull up plants in excess of a fair stand. The most important point in onion culture was harvesting. Neglect in pulling and carting might result in great damage. If mature bulbs were left in the ground, and a period of rain should follow, growth would be renewed. The second growth ruined the bulb for market unless for immediate use. Onions should be left on the ground a week or more in fine weather, and the best thing was to gather the crop and spread it thinly on a dry floor under shelter. The best method of growing onions was to sow the seed in nursery beds and transplant the seedlings in the open field. The crop would be twice, possibly three or more times as large as when seed was sown in the open. Experiments at Ohio, U.S.A., gave 100 per cent. and more increase with 14 varieties tried. A nursery bed 9ft. x 40ft., and from 1½lbs. to 2lbs. of seed was required for an acre. Seed should be in rows 1½in. apart and 1in. deep, and scattered evenly. In eight weeks plants would be ready for transfer to the open ground. They would need repeated clipping, the aim being to get seedlings, the bulb of which, just above the roots, was between ⅛in. and 3/16in. in diameter. The job of planting an acre was equivalent to not less than 25 days' work. Transplanting so many onions might be a costly operation, but it relieved the grower of much, if not all, weeding, and entirely of thinning out. The saving in these aspects more than paid for the labor of transplanting. The rows should be 1ft. apart, and the onions 3in. apart in the row. They should be planted when the ground was freshly prepared, with the fingers alone. Trim off a part of the tops if long and slender, and the ends of the roots. The soil must be moist and crumbly. The advantages of the new onion culture were:—(1) Earlier ripening of the crop; (2) decided improvement in shape and uniformity of the bulbs; (3) quicker sale and better prices; (4) greater increased yield. Growing for seed required perfectly sound, well-matured bulbs, which should be set in furrows 6in. deep and 4ft. 6in. apart. Furrows might be 3ft. apart. Seed was ripe when the pods and the upper end of the seed stalk turned yellow, and part of pod burst open. The following insects and diseases affecting the onion crop were dealt with, and remedial methods given:—The onion maggot, onion thrip, onion smut. Any person going into onion growing in a practical manner, the paper concluded, might count upon a steady means of income, and one worthy of attention.

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## RAMCO.

June 4th.—Present: 10 members.

**Peach Aphis.**—Mr. J. J. Odgers contributed a paper on this subject. He said with the advent of spring not only did the trees burst into fresh life, but many of the orchard pests found congenial conditions, and soon kept the orchardist busy. To the peach and nectarine grower no pest at that time caused him more worry and constant work than did the peach aphis. That insect increased with marvellous rapidity, and the fruitgrower needed to spray every other day to keep it in check, let alone exterminate it. The first brood appeared as winged insects, and each was capable of producing a colony wherever it alighted, and in an astonishing short space of time. That brood, unlike the first, was wingless, but at once began to suck out the sap, and at the same time to throw off young, and so the process continued as long as the weather was favorable and food plentiful. Unless it was checked, fruit was spoilt, and even the vitality of the tree so lowered that it might die. At the approach of cold weather the insects laid eggs under leaf buds, bark, or other sheltered places, where they remained dormant during the winter season. The egg-laying generation thus appeared to be a means for meeting the severity of the winter and the scarcity of food. The fact that the brood produced from the eggs passed through the usual stages of insect life seemed to point to the aphis in its present type being a degenerate form of an active free-flying form of insect, and had become so degenerate from too great an ease in obtaining its food. Until the last few years it was considered that the aphis wintered in the roots of the trees, and various were the means advocated for destroying it. Some advised clearing the soil away from the roots and pouring tobacco solution on them, and then putting back fresh soil to cover the roots. Others suggested tying a bandage around the butt of the tree and smearing it with some sticky substance to trap the insects as they scaled the tree. When once on the tree the insects might be killed by covering them with a greasy film and smothering them, and the standard remedies were spraying with kerosine emulsion or tobacco solution. He had tried both, but the tobacco solution was more effective. With the kerosine emulsion there was a danger of getting it too strong and spoiling the fruit. Kerosine emulsion was made as follows:—1oz. of soap dissolved in 1pt. of water, was brought to a boil, then taken off the fire and 1qt. of kerosine added. The solution was then churned by a syringe or the spray pump until a cream-like emulsion was secured. That was the stock solution. For use, one part of the emulsion was added to nine or more parts of water, according to strength. Tobacco wash was made by boiling 4ozs. tobacco, ½lb. soap, and 4galls. of water. In spraying, one needed to be careful to thoroughly drench the insects, for the spray only killed by contact, and as they collected under the leaves it was a difficult matter to completely destroy them. He did not think that the aphis came up from the roots, but wintered chiefly in the tree, and although the trees were watched closely very few insects were noticed. He had found that spraying the trees in winter with an oil mixture spray was more effective, as one could do the work when the trees were bare, which killed the insects much more quickly. The spray could be used after the trees were in leaf, but then it must be much weaker, otherwise it was likely to burn the foliage. In the discussion which followed Mr. Darling considered curl leaf more destructive than aphis, and advised steeping the tobacco instead of boiling it. Mr. Dunning had tried many remedies, and found tobacco and soap best. He agreed that aphis did not winter on roots, and favored a winter spray.

## ROSY PINE.

June 6th.—Present: 12 members and one visitor.

Can We Produce More on Our Farms.—In a paper dealing with this topic, Mr. Schiller said the increasing cost of labor, taxes, and the almost prohibitive prices of some of the machinery during the last few years made it essential that each farmer should produce as much from his land as he possibly could. Practically the whole of that district was devoted solely to the growing of wheat. Sheep could be well and profitably kept on much of the land while it was lying idle. The land benefited in no small degree when sheep were grazing on it. The droppings replaced some of the plant food constituents that had been taken out by successive cropping, and fallow land was kept much cleaner. Then one had one's own mutton to kill, and lambs, which were a good source of revenue. Wools, also, at present prices, added another item to the benefits derived from keeping sheep. Pigs, cows, and poultry, each with their products, were well worth the consideration of every farmer. Good discussion followed, and members agreed with the paper.

## WILKAWATT (Average annual rainfall, 16in. to 17in.).

June 2nd.—Present: 10 members and one visitor.

Mixed Farming.—In a paper on this subject, Mr. D. F. Bowman said that farmers ought not to restrict their attention solely to the growing of wheat. Cows, fowls, and pigs, well cared for, were a good and reliable source of income to the farmer. Sheep should also be kept, as they helped to keep one's fallow clean and supply meat for the household.

Treatment of Fallow.—This was the title of a paper read by Mr. W. J. Taylor. Fallowing should commence directly seeding was finished, not spelling the horses, as was done in many cases, the best idea being to get the fallowing done as early as possible, and then give the horses the rest they had earned. Paddock feed also would then be much stronger. Ploughing should be done to at least a depth of 3in., and if one had the strength, 4in. deep. That would pull out many stumps that would otherwise be missed. A leaf of harrows fastened behind the plough would smooth the ground and help to bring a few stumps to the surface. Keeping the fallow clean was also an important factor, and, if possible, sheep should be kept. Harrows and spring cultivators made a good substitute. September was generally the best time in which to work the fallow with a cultivator, crossing the furrows to a depth of 1½in. to 2in. The land should be harrowed after rain of, say, ½in. up to the time of seeding, to conserve as much moisture as possible. After seeding it should be harrowed once more and the crop allowed to grow slightly before rolling. Another paying proposition was to get a crop of peas off the fallow. Those put nitrogen and humus into the soil, of which the white sand land was practically devoid. Early next year one could cultivate and drill in oats. The writer of the paper also considered that would help to eradicate "take-all." Good discussion on both papers followed.

## WYNARKA.

June 2nd.—Present: 10 members.

Question Box.—Various questions were submitted to and answered by members. Mr. T. Yeates considered the stump-jump plough with bridle draught was the most severe implement on horses' shoulders. Mr. Richardson considered a disc plough with spring draught harder. Mr. Beck stated that harvest implements had given him the most trouble, probably due to the hot weather. Mr. J. Boyce advocated drilling to a depth of 1½in. to 2in. with land in its present moist condition. Mr. Rackham favored deep drilling in a wet season and shallow in dry weather. Mr. Hood considered that shallow seeding was more liable to a setback if a dry spring followed. Mr. Schultz thought that horses rugged and turned out at night did better than those stabled and not rugged. Mr. Yeates agreed, and Mr. Beck mentioned that after two years' experience with rugs, he was a strong advocate of the practice. Members then discussed the relative values of standard super. and super. B. "An Advantage of a Housewife on a Farm" was the title of a short paper contributed by Mr. V. Close.

BRINKLEY, June 4th.—Mr. W. Pearson read an extract from the *Journal of Agriculture* on the report of the Veitch's Well Experimental Farm, dealing with the different results obtained from the various quantities of seed and manure sown. He advised members to experiment with various kinds of grass seeds to find out which were most suitable to grow on the poorer classes of soil or land not adapted for cereals.

**HALIDON, June 6th.—A general discussion took place on the best means of destroying mice, the consensus of opinion being that the more satisfactory steps to take were to sink kerosine tins level with the ground close alongside haystacks, and poisoning by means of poisoned wheat.**

**KI KI, June 4th.—Annual Meeting.—Members discussed the best means of coping with the rabbit pest, after which election of officers for the ensuing year took place.**

**POMPOOTA, June 13th.—An address dealing with the principles underlying pruning was delivered by the Horticultural Instructor (Mr. George Quinn), and subsequently that officer gave a practical demonstration on pruning young deciduous and citrus trees and vines.**

## SOUTH AND HILLS DISTRICT.

### BLACKHEATH.

June 2nd.—Present: 11 members and nine visitors.

Cultivation of Soil for Wheat Growing.—Mr. E. H. Pym contributed a paper on this subject. He said in this immediate locality one had to deal with the fact that in an average season the ground was too wet and in places too boggy, which made it difficult to put the whole of the seed in at the best time. This could, to an extent, be overcome by the farmer fallowing more land, as the land that had been fallowed the previous spring stood more rain, and would produce better crops. It might be said that the land in that locality was not suitable for fallowing. He did not agree with that idea, although patches might drift slightly, it would not do so to any harmful extent. It had been proved and tested throughout the State that fallowing was most necessary, and also an important factor in the preparation of soil for the growing of wheat. In the first place it was not advisable to fallow too early, but to allow the weeds to be well forward and then to plough as deep as the soil would permit. The fallow should be worked at least once before harvest and once again before September, not so much with the idea of conserving moisture as to open up the ground to the energies of sun and air. Sheep should be kept on the fallow as they helped to keep weeds in check. Although recommending one to work the land with a good cultivator he would not do so while it was in a dry, powdery state. Better germination and growth would result if a good seed bed were prepared for the grain. The harrows also should be used wherever it was deemed advisable, both before and after the drill, with the exception of those parts that were boggy or set from excessive rain. A disk drill was more useful in that district, unless the ground were very clean. Superphosphates in larger quantities could with success be put into the ground, and from recent observations and experiments better results would be obtained. Discussion followed.

### BLACKWOOD (Average annual rainfall, 27in. to 29in.).

May 21st.—Present: 13 members.

Irrigation Waters.—Mr. W. L. Summers dealt with the subject of irrigation waters in the following paper:—"As most of the members are directly interested in the use of water for the growth of crops a few notes on the effect on the land and crops of water containing more or less salts may be of value. In using the term salts, it is intended to cover the various carbonates, chlorides and sulphates usually found in water, and not to refer solely to salt as usually understood, namely chloride of sodium. The question as to whether the continued application of any water to the soil will have an injurious effect depends upon several factors in addition to the actual quantity of salt contained in such water, for instance the chemical and physical condition of the soil, climatic conditions, the nature of the crops grown, &c. If the soil is a light to good loam overlying a subsoil that permits of fairly free under drainage it would be safe to use water containing such a quantity of salt that would quickly prove disastrous on a soil with retentive or ill-drained subsoil. In the former case the surplus water drains away underneath, carrying with it considerable quantities of salt, and in the winter the natural rainfall washes out further quantities of salt, thus preventing any accumulation in the surface layers. On a badly-drained soil the surplus moisture is evaporated from the surface, leaving behind the solid contents, and besides any salts naturally in the soil will gradually accumulate in the surface layers. In such a soil it is easily possible by the excessive use of even good water to bring about such an accumulation of salts in the surface layers as to seriously affect its productive capacity. If the soil is naturally free from injurious salts a 'saltier' water may be used with safety than would be the case with a soil naturally approaching the danger limit in regard to salt. Then climatic conditions have an important bearing on the question under review. In this district, for instance, with a 28in. rainfall there is naturally much less risk of the salts accumulating in well-drained soils than in a district with, say, 10in. In our case we apply less water calculated in acre inches than falls on the land from the clouds; in the other the grower applies, as a rule, at least twice as much artificially as the land receives naturally. Though not directly connected with climatic conditions, we have to consider the possibility, either in the winter or early spring, of being able to supplement the beneficial effect of the rain by flooding the land with water containing comparatively little salt, and leaching out the injurious salts which may have accumulated during the previous summer's irrigation. Then there is a great difference in the toleration of salt by different crops. Mangolds, beets, sunflower, sorghum, artichokes, and asparagus will stand relatively heavy quantities of salts; most of the legumes, on the other hand, are decidedly sensitive. Maize is in marked contrast to sorghum, while most of the cultivated members of the mustard family are also susceptible. Again established plants will stand much more salt than young plants of the same order. A Californian report, for instance, states that while young lucerne will hardly exist in soil containing 13,000lbs. of salts per acre in the first 4ft. of soil, established lucerne will live in soil containing eight times as much salt. I will have occasion later to refer to a local instance of this. Hilgard, of California states that water containing as low as 40grs. of salt per gallon may be dangerous if consisting chiefly of sulphates, chlorides, and carbonates of potash and soda, and even less of magnesia may be dangerous. He also states that in general practice in California the upper limit of mineral content in ordinary practice lies below 70grs. per gallon. In Egypt, however, water containing as much as 200grs. per gallon is used at times, but great care is exercised to prevent, by leaching with good water, the accumulation of salt. Another authority puts the danger limit at 100grs. per gallon—above this care must be taken that the conditions are suitable to the removal of any accumulation of salt by leaching at short intervals. Having dealt with some of the general aspects, I propose now to refer to local experiences and results. In our own district of recent years quite a number of relatively deep bores have been sunk, and in nearly every case good supplies of water have been obtained. I have been able to have several of these analysed with the following results (shown in grains per gallon):—Bore No. 1—123ft. (*a*) sodium and other chlorides, 53.6; calcium and other carbonates, 26.5; total, 80.4. Bore No. 2—113ft. (*a*) sodium and other chlorides, 34.4; calcium and other carbonates, 25.7; total, 62.2; (*b*) total, 82.6. Bore No. 3—80ft., sodium and other chlorides, 50.8; calcium and other carbonates, 28.2; total, 83.2. Bore No. 4—130ft., sodium and other chlorides, 59.1; calcium and other carbonates, 30.2; total, 98.9. Bore No. 5—82ft. sodium and other chlorides, 26; calcium and other carbonates, 11.6; total, 38.8. All these waters have been used freely on various crops. No. 1 is from bore near Mr. G. W. Summers' residence, No. 2 on R. H. Hewett's, No. 3 on Mr. W. L. Summers, No. 4 on Mr. T. C. A. Magarey, No. 5 on Government Orchard. It will be noted that there are two samples from No. 2, the second after six months' pumping. It is evident that the first sample was not representative of the actual flow. Nos. 1, 2, and 3 are practically identical, though No. 1 is two miles away and on the opposite side of the valley to 2 and 3. So far I have used the water through sprinklers on all classes of culinary vegetables, on lucerne, and in the flower garden, have started vegetable seeds and also lucerne with it, and I believe I can say without the slightest trace of damage, though I admit I had what appeared to be a trace of burning on perennial phlox, and some balsams and zinnias, but I am inclined to blame the unseasonable summer, as the majority of my balsams and zinnias did well with liberal waterings. I believe my results correspond with all the others, excepting Mr. Magarey, who has had some 'scalding,' and he will doubtless be able to tell us on what variety of plants. While I only know of one case in the valley, Mr. W. Cullen's, where the underground water has been too salt to use, several of the shallow wells contain a higher percentage of salt. On the Blackwood ridge, however, I believe most of the water in wells is decidedly salt, and even in the deep bore on Mrs. Davies Thomas's property this was the case. I have very little doubt that with our heavy winter rainfall the water from all five of the bores referred to can be used freely without the slightest risk, except, possibly, No. 4, and this should be quite safe except for really tender plants. On the Adelaide plains we have large numbers of bores and wells from which water is pumped for irrigation. Round Glenelg, Richmond, Fulham, &c., water containing up to 95grs. per gallon is used with great success for many crops, and particularly lucerne. Some to the south and east of the city, containing from 100grs. to 150grs., have been used, but I have no details as to results. North of the city there are several supplies containing over 100grs. per gallon used for lucerne. At the Abattoirs there are several bores from 270ft. to 350ft. in depth, giving water carrying from 158grs. to 277grs. per gallon, and with the exception of the latter these have been used freely for lucerne growing with great success. Two bores, one giving water with 170grs., and the other 204.5grs. per gallon, are coupled up, and the water used regularly for lucerne, but it is necessary to start the lucerne in the winter, as until several months old the plant is not able to stand this water. Another interesting case of water containing an unusual amount of salt being used successfully may be quoted. Mr. E. Gill, of near Spalding, is using water containing 183grs. of solids per gallon, 88.2grs. being chlorine, and 10.35grs. magnesia. The soil is a dark loam with limestone subsoil at from 8in. to 2ft. Apparently the drainage is good, and at times water of much better quality is used, but at the same time it is surprising to find that after 10 years' use in large quantities splendid results are still being obtained with trees, lucerne, and all classes of vegetables. A careful investigation of the waters at present being used with success for irrigation together with examination of the soil and subsoil would give results of great value to all interested in this important subject.''

### CHERRY GARDENS (Average annual rainfall, 35.03in.).

June 5th.

Pine Planting.—This subject was dealt with in a short paper by Mr. H. J. Paddick. When the site selected for planting pines was a wet one, he said, it was well to make a hole about 18in. deep, and into this put some rubble. The object was drainage, and so check any tendency to destroy the roots. If that provision was insufficient, a small drain could be cut from the hole. If that practice were adopted, immediately the weather became finer the drain should be filled. When the young trees were put in the roots should be surrounded with some light loose soil. That would enable them to make a good start. In reply to questions, the writer of the paper recommended putting the trees in to the same depth that they were growing in the nursery, and in wet districts it was best to plant at the end of winter. In the drier localities earlier planting could be practised.

### CLARENDON (Average annual rainfall, 33.67in.).

June 4th.—Present: 13 members and three visitors.

Principles of Cultivation.—This was the title of a paper read by Mr. E. A. Harper. First of all, it was necessary to consider the class of land one had to work. If stony, shallow cultivation was better; but if one had a good depth of soil, it could be cultivated deeper. The plough was the main implement used, and careful consideration should be given to local climatic conditions as to the time to start work. As a rule, the first ploughing should be commenced soon after the first good autumn rains. Sandy soil could be worked almost at any time. The character of implements used in cultivation also had an important bearing, both on the progress of the work and its results. Rough and stony land should be ploughed with the stump jump implement. Those ploughs did very good work, and were especially adapted to that class of country. Double furrow set ploughs were preferable, provided one had good clean ground and steep side hills to work. The best way was to plough in order to conduct the water on gentle slopes. As to the depth of ploughing, one had to use one's own judgment. He believed stubble ground, if ploughed for crop, should be worked to a depth of 5in. to 6in. Land on which peas had been previously grown, if free from weeds, should be scarified soon after the first rains, to encourage the weeds to grow, and then at seeding it should be gone over again with a light cultivator. If it were weedy, it should be ploughed shallow, say, 2in. to 3in., just in order to turn it over. It should not be rolled too much. It was better to have it slightly rough than too fine.

### HARTLEY (Average annual rainfall, 15in. to 16in.).

May 2nd.—Present: 13 members.

The Agricultural Bureau.—Mr. F. Lehmann contributed the following paper with this title:—''After being a member of the Agricultural Bureau for over 20 years I would like to give you an account of its usefulness to the farming community. It brings together farmers within a radius of from 10 to 15 miles to discuss matters relating to their interest, and through those meetings they become more social than would be the case otherwise. The ambitious farmer comes along because he can excel his neighbors in some line of farming, and takes pleasure in giving or getting information in his special line of study. One farmer will take the Merino sheep as his hobby or line of profit; from him you can get points on wool-growing. Another will raise sheep for the meat market, and tells you the Crossbred pays better than the Merino. Another will be a horse fancier; he will give you horse talk, not always expert, but which will raise discussion, and so has its value; so we may go through the whole of the farm in 12 months and gain some knowledge at every meeting. In the farming community, as in other trades, you have the theorist as well as the practical man. The practical man tells you what he has done; the theoretical member tells us what we should do to improve on our methods—often quite right when put into practice. Some have an objection to such members, but if their teaching is good, let us benefit by it, not trouble about what he does or does not do. At our meetings we have the talker and the silent one—who derives the most benefit is doubtful. The homestead meetings are very valuable to the Bureau, as also are the drives around the district, during which we can see what others do. The object of the Bureau is to gain knowledge by exchange of thought or practice between farmers, or from the heads of the Department; so it rests with members how best to get our brains to guide our hands so that we will get the best results from our work. The Agricultural Bureau is doing this; but we have only started.''

MACGILLIVRAY (Average annual rainfall, 19in. to 20in.).
May 8th.—Present: six members and one visitor.

Pig-Raising.—Although we are somewhat handicapped in the distance from market, pigs have not received the attention that should be given them by farmers in the district, said Mr. R. Wheaton in a paper on this subject. When properly managed three or four breeding sows should prove the most profitable sideline of the farm. There was no farm animal that ate more in proportion to its weight, or turned its food into a saleable carcass so rapidly or efficiently as the pig. Under natural conditions the pig was a grazer, and for sows and growing pigs green feed should form the greater part of the ration, and when possible they should graze it for themselves. A convenient spot on a piece of rising ground should be selected for the sties, which should be well ventilated, but not draughty. In addition to the sties it was necessary to have four or five plots of from half to one acre each, well fenced with pig netting, and two barb wires, one along the ground, and the other 5in. or 6in. above it to keep the pigs from rooting the netting. In those plots most of the green fodders could be grown, and they could be fed off consecutively. With a little care a good supply of succulent feed could be available for most of the year, and that advantage should more than compensate for the little extra trouble and expense in marketing. The following crops had been grown successfully in the district:—Cape barley, rape, peas, turnips, chou moullier, silver beet, pumpkins, pie melons, mangolds, and lucerne, and by selecting those most suited to conditions one was placed under they would supply the necessary green feed for the year, and thus reduce the cost of raising pigs in comparison to feeding grain alone. A supply of grain was also required, and Cape barley made good feed besides being a good yielding crop to grow. Any grain could be used, but barley and oats must form the main feed, the former for fattening, and the latter for store pigs. All grain should be well soaked or crushed, preferably crushed. As to which was the best breed, that was a matter of opinion. He preferred the Berkshire, but whatever the breed the pigs would not be a success unless well fed. The boar was the first consideration. It should always be pure bred, and the best that could be secured. It should not be used for stud purposes until eight months or nine months old. The sow should be long, roomy, and deep, with broad loins and a strong back, qualities which gave capacity for big litters. She should possess about 12 evenly-formed teats, and should not be mated until eight months old. If used too young she would either produce small litters or larger litters of uneven pigs. When a sow produced a small litter of four or five, that number of teats was developed at the expense of others. Should the next litter be large some of the pigs would be poorly developed, as they would have to depend on nourishment from poorly developed teats. A sow should produce two litters a year, and breeding should be arranged so that sows did not farrow in winter time; March and September were the best months. The weather was then more temperate, and better for the sow, and there was not the risk in rearing the young pigs. During the period of gestation the sows should have the run of a block of green feed. When that was good they would not require much else, but if green feed was not up to the mark a little crushed grain would be necessary at night time. Sows should not be too fat, or a whole litter might be lost. About a week before farrowing they should be put in the pen, and fed on green and soft food. After pigging they should be gradually fed up with crushed grain and milk, and should be given as much as they would clean up. At three to four weeks old the suckers would begin to feed themselves, and should be fed in a shallow trough away from the sow. At four to five weeks the boar pigs should be castrated, and at seven weeks they could be weaned. They should be well fed for two or three weeks after weaning, when they could be put into a good plot of green feed and given crushed grain every evening. When old enough to be fattened they should be brought back to the pens and given as much crushed grain and milk as they would clean up three times a day. Pigs should not be sent to market unless they were prime, as with all classes of stock, it was the good quality that brought the best prices. Pigs should always have access to a trough of clean water, besides the other food that might be given. It was also necessary to have some charcoal in the yards. In each small paddock a good shelter should be erected so that the pigs would be dry and warm and always be supplied with bedding. If they were not comfortable they would never do well. In the discussion that followed Mr. Petras favored boiling mangolds and turnips, and when boiled putting in corn. Mr. Williams considered pig-raising most profitable when combined with dairying, and with the Chairman (Mr. Nicholls) said that potatoes could be grown, and, when cheap, could with advantage be fed to pigs. The Chairman was of the opinion that the market was too uncertain to keep a number of pigs.

## MILANG.

May 12th.—Present: 27 members.

Afforestation.—In dealing with this subject Mr. Yelland emphasized the fact that people should raise their own trees, and thus acclimatise them to the locality. Trees grown by himself were found to be hardier, withstood both winds and frosts better, and very seldom failed to start when planted out. He also stated that landholders, who so desired, should have the right to be allowed to plant trees on roads adjoining their holdings, which formed a valuable asset, and added greatly to the beauty of the holding. The trees gave a much-needed shelter to stock in the hot months of the summer season, and in winter gave natural warmth. Mr. Yelland answered numerous questions, and gave a practical demonstration of pruning fruit trees and vines.

## MILANG.

June 9th.—Present: 37 members.

Sidelines on the Farm.—Mr. A. D. Matheson contributed a paper on this topic. He said dairying, sheep-breeding, horses, pigs, poultry, &c., represented the chief sidelines to which almost every farmer could apply himself. It was difficult to define what was the standard of cows to keep, but without judicious hand feeding one could not derive the full benefits. Cows which for the first three months after calving were giving about 3galls. of milk per day with a butter test of 4 per cent., would be a valuable asset. Grazing on good pastoral land was undoubtedly the best, but chaff and bran given twice a day to good cows would materially assist in making them a profitable sideline. Good labor and attention were essential, and he thought it unadvisable to keep too many cows, or they would probably be neglected during the busy seasons. Sheep were necessary in order to obtain the most from one's holdings. Present high prices for wool and lambs and the good they did in manuring and keeping fallow clean, made them practically indispensable. The great demand for Australian horses, brought about by the war, and the numbers lost through the last drought were two very good reasons why every farmer should raise as many foals as possible. There was hardly anything more profitable on the farm than pigs. At present the three breeds most in favor were the Middle York, Berkshire, and Poland China. Of these three the best milker was the Poland China. She usually had large litters, and reared them. Many farmers thought the Poland China the best type of pig to keep, but the Berkshire cross was also good, being very hardy and contented. He favored the Berkshire-Poland China sow put to a Middle York boar, providing one had good feed to push them forward. Sows did best on herbages, with a paddock to run in, as it provided exercise, and enabled them to secrete more milk. It was advisable to pen them a fortnight before farrowing, and to feed with a mixture of two of pollard to one of bran. A farm without fowls was so rare that it would be odd to advise a farmer to keep poultry. White Leghorns, with their wide reputation, were sufficient guarantee that fowls were profitable. Geese and turkeys when the demand was good would also return good profits.

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### MOUNT BARKER (Average annual rainfall, 30.93in.).

June 6th.—Present: 43 members and 28 visitors.

Mr. F. E. Place addressed the meeting on "The Horse Suitable for Farm Purposes." An interesting exhibition of potatoes took place. Messrs. Pope Bros., won the certificate for the greatest yield from quarter of a square chain of land—8cwts. 3qrs., equallying 17½ tons per acre, and the cwt. of largest and truest to type of any one variety of potatoes. Snowflakes alone were exhibited. Mr. F. Simper won the certificate for the dozen heaviest potatoes—his exhibits weighed 37lbs. 12ozs.; largest potato, 5lbs. 9ozs.

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### STRATHALBYN (Average annual rainfall, 19.28in.).

June 12th.—Present: 19 members.

Rope Making.—Mr. Abbott, with the assistance of his two sons, gave a practical demonstration of making rope from binder twine as taken from sheaves after the knots had been cut. His machine was of his own invention, and in a short time he made a first-class piece of useful rope. Hay or plough lines could also easily be made, he said. Mr. W. M. Rankine gave an exhibition with a machine that he had purchased for doing the same work. Members were of the opinion that Mr. Abbott's machine was equally successful, although three were required to work it.

INMAN VALLEY, June 7th.—Farming Machinery.—A paper was contributed by Mr. G. McCoy on this subject. He traced the history of farming from the days of the scythe to the present day, and expressed the view that the reaper was more suited to this district than the harvester.

KANMANTOO, June 2nd.—Mr. H. R. Shepherd contributed a very interesting paper of his experiences while on active service abroad.

LONGWOOD, June 9th.—Homestead Meeting.—Members inspected Mr. Cole's garden. He had planted as an experiment 26 varieties of grapes and a number of prunes, and as the locality was not considered favorable for the growing of vines, much interest will be taken in their progress. The Hon. Secretary (Mr. J. R. Coles) read the annual report. A splendid sample of Garton Early White oats was tabled.

MORPHETT VALE, June 9th.—Members discussed the difficulty of drilling in sticky ground, and the advantages of disk drills and ploughs in various soils. The combined plough and drill was considered worthy of a trial in this district.

PORT ELLIOT, June 16th.—Mr. H. Green tabled a splendid sample of dried apricots and horse beans. Owing to small attendance it was decided that Mr. Green should read his paper at next meeting.

URAIDLA AND SUMMERTOWN, May 7th.—Mr. G. A. Dunn, M.P., attended and gave a lecture on "The Methods of Co-operation in the Fruit Industry," which was appreciated by the members.

## SOUTH-EAST DISTRICT.

### GLENCOE (Average annual rainfall, 33.84in.).

April 5th.—Present: eight members.

"The Selection and Cutting of Seed Potatoes," was the title of a short paper contributed by Mr. A. von Duve, who mentioned that imported seed yielded better the second year, as the first year's planting was not acclimatized. The seed should always be cut toward the crown, and in squares, as they then retained the sap much better. Mr. F. A. Telfer said that he did not consider that it mattered which way a potato was cut, if only the setts are large enough. He did not believe in planting round seed at all, and bought big potatoes from other districts every year, and he was quite satisfied that it was a profitable system. He did not believe that Glencoe land was worn out for potato growing, but with good seed, cultivation, and the return of summer rains that they had missed of late years, crops would be as good as ever. Mr. J. Fraser agreed with Mr. Telfer that the system of cutting was immaterial if the setts were large enough so that they would not shrivel up. He mentioned that years ago he had known a grower at Mount Gambier plant potatoes 18in. apart for the purpose of growing potatoes seed size. Mr. A. Dow said that some years ago he imported seed from two different places, and also bought local seed, and the local seed gave the best results. Mr. J. Dow said that in his experience seed from peat or sandy soil gave the best results. The secretary had found that lime sprinkled on the cut potatoes formed a coat on the cut surface arresting decay, and also making them much better for handling when planting.

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### GLENCOE (Average annual rainfall, 33.84in.).

May 3rd.—Present: 13 members and one visitor.

Irrigation.—A short paper on this subject was read by Mr. J. Dow. After considering this question he said he had come to the conclusion, on account of the nature of the soil, that it would not be profitable to practice irrigation in that district by means of flooding. Water would have to be applied by means of sprinklers. It would not pay to irrigate potatoes on account of the uncertain market. The Secretary hardly thought that irrigation was necessary in that district, as with thorough cultivation good fodder crops could be grown without it. With irrigation it was necessary to have some system of underground drainage to prevent the land from becoming waterlogged. He suggested that it would be well to have the well water analysed to make sure that it was suitable for irrigation purposes. Mr. M. D. Cameron strongly advocated that farmers should establish plots of lucerne for irrigation, and was convinced that Glencoe would develop to its highest production by lucerne growing under irrigation and dairying. He did not consider there was any need for underground drainage, as the soil was so porous, and the rainfall so great that any injurious effects would be cleared away. Lucerne should not be sown on low-lying land where the spring waters were likely to rise to the surface, as that was absolutely fatal to lucerne. Mr. R. Agnew said that a neighbor of his had a small paddock of lucerne, portion of which was irrigated by sprinklers, and the remainder unirrigated. The irrigated portion had yielded five cuts for the season, and the other was no good at all. Mr. H. Bodey said that in the Wimmera the lucerne was cut and then flooded every six weeks during the season. Mr. T. F. Gratwick was of the opinion that irrigation would not be a payable proposition on Glencoe. Mr. A. Dow had known splendid results as far as growth was concerned by irrigation, but in one case that he had in his mind, it was said that the water cost more than the fodder could have been purchased for. Mr. J. T. Halliday said that lucerne should be sown in August, and the first cut made as soon as possible, then it should be irrigated and well harrowed, for it would stand any amount of cultivation; care should be taken, however, not to irrigate too late in the autumn, otherwise mildew and thrip would develop. Cabbages, swedes, and other fodder crops would also pay well under irrigation. Water should not be pumped direct from the well to the land, but into a tank, to allow it to aerate. Pigs would thrive well on lucerne as well as cattle, horses, and sheep. Mr. L. Flett said that lucerne would have to be cut while very tender to feed to pigs, as they would not eat hard stems.

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### KALANGADOO (Average annual rainfall, 33in. to 34in.).

May 12th.—Present: 11 members and one visitor.

Fodders.—Mr. John Davison addressed the members on "Fodders," also "Red Clover, and the Value of the Bumble Bee as a Seed Fertiliser." He said a variety of fodders had been tried on a small scale with success in the district. Kalangadoo soil had proved capable of growing maize 9ft. high, yielding 30 tons per acre on land too wet for oat growing. He strongly recommended growing lucerne for cattle, sheep, and pigs. Lucerne grew bulky in the lower South-East without irrigation, but with water the results were greater. One could scarcely estimate the increased carrying capacity for sheep and cattle in the stretch of territory between Bordertown and Mount Gambier, were the land cultivated and sown with damp land grasses, such as lucerne, red clover, cow grass, alsike, Timothy, and so forth. English and Italian rye grass, white and strawberry clovers, and schanck on the drier banks produced excellent feed, and were established already in quite a few spots. The speaker advocated the liberal use of farm and artificial manures, and the extensive sowing of Cape barley for autumn and winter feeding of cows. The splendid samples of red clover (*Trifolium pratense*) he had seen growing at Kalangadoo proved that the land was only waiting to be tickled with a hoe to laugh itself into a harvest. Red clover was one of the staple hay fodders of most European countries, and in New Zealand some landholders had up to 700 acres of it for the production of feed and seed. The lower South-East was the closest approach in Australia to the moist farm lands of New Zealand, and red clover, and its cousin, cow grass, were worth anything from £10,000 to £100,000 a year to the farmers of the Dominion for dairy cows, sheep fattening, and hay purposes. In a few spots in the South-East, where it had been given a chance, red clover had done well. It was a permanent plant, a gross producer, and belonging to the leguminous family, improved the soil upon which it grew by collecting nitrogen. Mr. Davison then dealt at length with the history of the bumble bee, and its introduction to New Zealand, and showed the value it was in bringing about the fertilisation of red clover and alsike.

### KONGORONG.

June 5th.—Present: 14 members and four visitors.

Dairy Farming.—"Among our agricultural pursuits, dairying holds first place, from the standpoint of the necessity for a broad scientific education," postulated Mr. H. W. Bannister, in a paper dealing with dairy farming. "It also ranks high as a remunerative industry, when conducted on business principles and with the proper class of cows. It is useless entering the dairy business unless there is a natural liking for the cow, and a keen desire to help her to do her best. After all, much depends on the man. To be a successful dairyman a man must first be a successful farmer, he must understand soil conditions and the growing of crops. He must have a good farm well farmed, as well as a good herd well cared for. Every crop grown on the farm has a value as a fertilizer, and when sold permanently removes that amount of fertilizing matter from the farm. Very often a man will make a profitable investment by buying a run-down farm at a low figure, and stocking it with dairy cattle will return the manure to the land, improve the exhausted soil, and raise good crops in a few years. The health of the cows and the purity of the milk depends greatly on the stables. Four things are of prime importance—sunlight, pure air, tight, dry floors, and the comfort of the animals. When the air of the stables is filled with offensive odors, it is carried into the milk pail, and the damage is done. A good floor is made of cement, made up of, say, one part of cement, two and a half parts of sharp sand, and five parts of broken metal. After thoroughly mixing the whole dry, water should be added evenly with a watering can, the whole meanwhile being well turned over and mixed together. Lay the floor 4in. thick and trowel it to a smooth surface in one operation. The floor should have a fall of not less than 2in. in 10ft. Nothing adds so much to the general appearance of a homestead as having all the buildings painted; besides, the paint preserves the wood. If oil paint cannot be afforded, a good durable whitewash is a good substitute. It makes old buildings look as good as new. A good whitewash for outside is to slake ½bush. of lime in boiling water, strain to remove all sediment, add 2lbs. of sulphate of zinc, 1lb. of common salt, and ½lb. whiting, thoroughly dissolved; mix to proper consistency with skim milk, and apply while hot. If white is not desired, add enough coloring to produce the desired shade. We hear a great deal about the dual-purpose cow—one suited to produce milk and beef; but if dairying is the object, it is best to keep to the dairy breeds. The cows have already earned their way, and a profit from the carcass at the end of a useful life should not be expected. We should decide on one breed, and keep to it. Nothing looks better than a herd all of the one breed. The sire should always be pure bred, of good milking strain. Too much importance cannot be placed on the influence of the sire in establishing a good dairy herd. The cows need not be pure breed, but should be good grades. The breed is of importance, but the individual cow is what really counts. Every dairyman should have a certain minimum yearly milk standard, and if after a second trial a cow does not come up to it, she should be discarded. But be sure it is the cow's fault, and not the owner's, before you part with her. Many a good cow cannot do her best on the slim allowance of food and water and the indifferent care she gets.

The best dairy herds are built up by raising the best heifer calves from one's own best cows. Calves from cows that have been in good condition before calving are invariably the strongest. A cow must be well fed and cared for if she is to keep up a flow of milk and at the same time nourish her unborn young. She should have a rest from milking from six weeks to eight weeks, in order to produce a vigorous calf and do better during her next milking period. Many farmers, as soon as a cow becomes dry, allow her to hunt for her living in one of their worst paddocks, excusing their neglect by saying she is doing nothing for her board. Is she not preparing herself to work again every day for 10 or 11 months, besides presenting her owner with a calf? Some stint the food, fearing milk fever. This is not to be dreaded if the cow is properly handled after calving. The main cause for this frequently fatal trouble is milking the cow out clean soon after calving. Only a little milk should be drawn at a time, and this should be done several times a day for the first day or two; this is how a calf would take it. A good plan is to leave the calf with her for the first 24 hours. If milk fever develops, it is usually a fatal mistake to dose. In many cases, the muscles of the throat are paralysed, and the cow has no power to swallow, and the medicine given goes into the lungs, and often causes death. The treatment giving prompt relief, and one to be relied on, is filling the udder with air by means of a pump. Tie the teats with tape to keep in the air. Massage the udder, to force the air to all parts. It may be necessary to repeat the inflation. This treatment usually effects a cure in a few hours. Do not give any medicines. Where a large number of cows run together, it is a good plan to have them dehorned. Calves may be dehorned when a few days old. Clip the hair where the rudimentary horns appear, and with a moistened stick of caustic potash rub the little buttons of horns until the skin becomes inflamed and tender to touch.'' In discussing the subject, Mr. W. Aslin objected to the pure-bred animal on the score that it was too thin-skinned for the district. Mr. H. C. Haywood said Jerseys would do well in the district if properly cared for. Mr. C. Kemp preferred the Holstein. Mr. C. T. Atkin did not pay much attention to the breed of the cow, provided she was a good milker. Messrs. W. Aslin and F. Kemp expressed a preference for the Shorthorn milking strain. Generally, members were in agreement as to the value of the use of a bull bred from milking strain. Mr. E. E. Morrison advised the testing of each cow.

SUMMER FODDERS.—''Of the different crops from which we may make a selection, rape must take first place for summer fodders on a large scale,'' said Mr. F. R. Uphill, in a paper dealing with summer fodders. It was most suitable for summer and autumn feeding. Given a good start during the spring and early summer, it would grow throughout the year. Sown about the first week in September, it would be ready to top up lambs when weaned. If not eaten out, it would grow right through the summer and autumn, and also well on into the winter. Sheep must have free access to dry stuff when feeding on rape, otherwise losses would occur. Maize was also a crop that could be grown with profit, making fine feed for cows when fed to them in the milky cob stage. He had maize 4ft. high which was sown in January. It greatly increased the milk yield when fed to the cows in the autumn. Land required to be deeply ploughed, to enable the maize roots to get down quickly, thus securing a quick growth. It made splendid ensilage. Kale was also a very valuable fodder, and when firmly established it could be eaten down very bare, and would come on again. He knew of a plot of kale that was sown on October 7th, 1914, which had 40 sheep to the acre on for two months, and there was still plenty of feed left. It had had stock feeding on it off and on ever since, and it was still doing well. Unlike rape, it was not necessary to have dry feed, as sheep would not bloat on it. Rape and kale could be grown successfully on some of the poorer soils, and by continuously growing fodder crops and feeding them off the land would be enriched. Sandy soils and ferny country could be improved in that way. In a district like that, where bush fires were so much of a danger, it would be a splendid thing if every landholder would take a strip of land 2ch. or 3ch. wide on one side of his holding (all agreeing to do the same side), and put in rape or some other fodder. He would have a fire break, and the feed would soon pay for the extra fence that would be required. In reply to questions, Mr. Uphill said rape should be sown in September or October. Kale was seldom attacked by blight. He advised planting maize by broadcasting the seed and ploughing it under. Mr. G. Wilby thought payable crops of rape and rye could be grown on poor soil if a dressing of superphosphate were applied.

## MILLICENT (Average annual rainfall, 29.25in.).

June 12th.—Present: six members.

Sugar Beet Industry.—This was the topic of discussion opened by Mr. Holzgrefe, who said it was of considerable interest to the Branch. Mr. Hart was at present at Maffra, in Victoria, inquiring into the industry. A discussion also took place on the means to awaken interest in the monthly meetings of the Bureau. Reference was made to the visit of Mr. Place, the Government Veterinary Surgeon, to Millicent, and the valuable address which he delivered. The Secretary complained of the disappointing attendances to the meetings of late. Members thought a better plan, although not suitable to all, would be to hold the meetings at night. After further discussion, it was decided to postpone a decision until the annual meeting.

## MOUNT GAMBIER (Average annual rainfall, 32in.).

June 9th.—Present: 18 members.

Noxious Weeds and Their Eradication.—The Hon. J. Botterill delivered an address, in the course of which he referred to a number of weeds of a noxious character which were now growing in or which threatened to invade the district. Star thistle and stinkwort, he said, were a great danger to the part of the district, and another weed that was objectionable was Jeffrey burr. If the matter of destroying the weeds were taken in hand now, a great deal of trouble and expense that would otherwise be incurred at a later date would be saved. The district council, he thought, should insist on the destruction of the Canadian thistle. He dealt with the danger of allowing different weeds to mature their seeds, and said the time to start destroying weeds was whilst they were still confined to a limited area. In the course of a lengthy discussion which followed, Mr. MacCormack mentioned that cultivation would kill the Canadian thistle. Mr. Botterill stated that he had cut a patch regularly below the ground for a period of nine years, and it still remained. He had destroyed small patches of stinkwort by uprooting it. Mr. Sassanowsky said the best way to destroy ''fat hen'' was to pull it up, especially after rain.

Keeping Apples.—Mr. A. J. Wedd laid on the table some fine samples of apples grown by him at Ardno. He had brought a few that would suit a cottage garden. The names were—Nickajack, Rome Beauty, London or Five-crowned Pippin, Adams's Pearmain, one of his own seedlings, Wolseley, Northern Spy (an early sort that took a long time—sometimes 10 or 12 years—before it bore fruit), French Crab, Lawrence, Cleopatra, and Hoova. He also tabled a few pears. Jonathan apples were really good keepers. Cleopatra was very subject to black spot, or fusicladium, in that district. In some districts it was not, and was the very best apple. The only remedy he knew was Bordeaux mixture, but it must be applied when the apples were forming. They could spray now for mildew or woolly aphis.

## NARACOORTE (Average annual rainfall, 22.60in.).

June 9th.—Present: 19 members.

Organic Manures.—A paper dealing with this topic was read by Mr. A. Johnstone. ''In this class are included all substances of vegetable or animal origin which have the property of enriching the soil or of rendering to it substances required by plants for food. All vegetable and animal substances used as manures must undergo decomposition before they become the food of plants, for the roots of these only absorb liquids and gases. This change is generally effected to a certain extent before they are applied to the soil; but in the case of green manures it takes place entirely in the soil. The results of the decomposition of organic manures are the formation of carbonic acid, ammonia, sulphuretted hydrogen, and many other compounds, which are retained in the soil, and from which they are taken up by the roots of plants. Leaves, when thoroughly decayed and reduced to the state of mould, form a kind of manure, which, alone or mixed with the soil or other substances, is eminently suited for the growth of most plants. Dry leaves, when used as litter, absorb perhaps less urine than straw, but as they contain much more nitrogen, they increase greatly the quality of the manure. Old tan is sometimes used as a manure, but it exercises an injurious action on the roots of plants, and also tends to promote the growth of various sorts of fungi. Peat may be said to be an accumulation of humus, produced by the decay of plants that have been submerged, and it would then seem to be derived from that which forms the first food of vegetation. But in the formation of peat highly antiseptic properties have been imparted, and which must be neutralized before it becomes fit for the food of plants. But bog earth and boggy swamps are capable of being rendered extremely fertile. To render peat fertile it is necessary in the first place to drain it, for until the water is removed the air cannot enter among particles of the peat, and in the absence of oxygen its elements remain without change. When dry and exposed to the action of air, moisture, and frost it is readily pulverised, and loses in a great measure its astringent principle. The correction of this is largely aided by the addition of lime, gypsum, or calcareous marls. For forming it into a manuring compost authorities recommend mixing the peat with alternate layers of sixth or eighth parts lime. When dry it may be employed as litter for sheep, and when saturated another layer may be spread over. By penning sheep on dry peat large quantities of excellent manure for garden crops may be obtained. Peat may otherwise be economised in two very important respects—first as a deodorizer; second as a vehicle for manure. For instance, when accumulations of nightsoil are removed, the emanations are alike injurious to health and offensive to the sense of smell, and it will linger in the neighborhood for days. But if the workmen sprinkled, as they proceeded, some of the charcoal made from peat, and a quantity over the heap when finished, no smell could be detected next day. Owing to the property which purely powdered peat charcoal possesses of condensing many times its own volume of gases, and notably ammonia, sulphuretted hydrogen, and carbonic acid, all of which are prejudicial to health, not only is smell prevented, but the escape of one of the most valuable constituents—ammonia—is secured. It seems to be owing to its power as an economiser and absorbent of gases that the roots of plants are found clinging around its particles wherever it is mixed with the soil. It is not, however, as a deodoriser of nightsoil only that peat charcoal may be employed with advantage, but to sewage as well. Sawdust is not of much value as a manure. It contains only slight traces of nitrogen, and when mixed with the soil it does not readily decompose. By the addition of liquid manure, of which it will absorb a large quantity, its value is greatly increased, and it is then much more easily decomposed. Rape dust, for turnips and root crops, is an excellent manure. Dissolved in urine rape dust is much used in Flanders. In dry seasons it is less efficacious than in wet ones. Malt dust contains about 4 per cent. of nitrogen, and according to Professor Johnston, its ashes contain 36 per cent. of potash and soda, and over 24 per cent. of phosphoric acid. From this it appears that malt dust forms a very good manure. It ought to be prepared by the addition of urine to the heap, and so causing it to ferment, when it may be applied at the rate of 30bush. or 40bush. to the acre. The beneficial effects of malt dust are owing to the formation of ammonia, and to some extent to the phosphoric acid, potash, and soda which it contains. It is rapid in its action, but is not of much permanence. Green Manures—Plants are sometimes grown specially for the purpose of being ploughed or dug in when they are in a green or succulent state. But whenever the ground is in a high state of cultivation, this practice is seldom adopted. A much more advantageous plan is to apply the green crop to the feeding of animals, in which way not only is manure produced, but food as well. The plants usually employed for the purpose of being ploughed or dug in are rape and buckwheat. There is, however, a class of green manure which is more extensively used in gardens. This consists of potato tops, turnip tops, the dressings of cabbages, rhubarb leaves, and all superfluous or decaying vegetables. But it is better to make them up into compost, and apply them to the soil in a decomposed state. Ferns abound in potash, and may therefore be applied to soils deficent in that element, or to crops which require much of it. Reeds as a manure are commonly employed in the South of France in a green state. Cut when in flower, they soon decompose. Soot consists chiefly of charcoal; its efficiency as a manure is chiefly attributable to its containing ammonia, the amount of which varies in different samples from 1 per cent. to 5 per cent. It should be kept dry till required for use, and applied at the rate of 20bush. or 30bush. per acre. As a preventive to the attacks of insects, half a peck of soot to a quarter of a peck of lime, mixed well, and allowed to stand till clear, form a useful wash. If sown together with turnip seeds, it quickly forces the young plants into the rough leaf, a matter of importance, inasmuch as when this is the case, the ravages of the fly are in a great measure prevented. Mixed with salt, it is a good manure for potatoes, and for onions, partly as a manure, but especially preventing the attacks of the onion gall. Asparagus, peas, and a variety of other vegetables may be manured with it, and with as much effect as with solid dung. As a liquid manure, and applied to plants in pots, it causes them to assume a deep healthy green and grow strong and luxuriantly. Blood is a powerful manure, not only on account of its nitrogen, but also on account of the numerous salts which it contains. Blood may be applied to the soil in a liquid state, or when dried and mixed with earth or other substances so as to form a compost. Fish form a very powerful manure and are rich in nitrogen and phosphoric acid. If used in gardens it should be mixed with earth, and plants will not then be liable to injury from the roots coming in contact with large quantities of unmixed and highly nutritious matter. Woollen rags, if chopped up into small pieces and buried in the soil, form an excellent manure. They decompose slowly, and are a good manure for fruit trees. Bones are extensively used in agriculture. Their composition varies according to the sort of animal to which they belong; it also differs in the same animal at different stages. They are used broken into fragments, more finely divided in the state of dust, dissolved in sulphuric or muriatic acid; also, mixed with guano or other fertilizers. When applied in a broken state less is required, and the effects are more lasting than if applied as dust. The quantity of ½in. bones or bonedust, from 12bush to 16bush. per acre, according to the nature of the soil, poor soils requiring more than rich ones to produce the same effect. Experience has shown that fresh or unboiled bones are possessed of more beneficial action than boiled ones, on account of the organic matter not being extracted by boiling. The action of this manure is to some extent due to the animal matter in the bones, but principally due to the phosphates which they contain. The soils they benefit most are dry ones that are deficient in phosphate of lime; wet soils are considered as unsuited for this manure. Bones are sometimes mixed with earth, ashes, dungs, etc., and allowed to ferment in order to effect their more speedy decomposition. A better method is to dissolve them with sulphuric acid. Nightsoil is a valuable and extremely powerful manure, richer in nitrogen than horse or cow dung. It can easily be deodorized by the use of charcoal, which is also of great value as an auxiliary manure. The ammonia is also fixed by using sulphate of iron, but it is not desirable to introduce any considerable quantity of salts into the soil; dry earth and sifted ashes are also used as efficient deodorizers. Peruvian guano is so universially known that it is unnecessary to discant on its virtues. Urine forms an exceedingly powerful manure containing various principals, which during putrefaction yields large quantities of ammonia. It should be allowed to putrify, and diluted with water very considerably, or mixed with soil to form a compost; an excellent liquid manure for fruit trees and kitchen garden crops. Human urine is by far the most valuable. Almost any manure can be applied to the ground in a liquid state, nevertheless liquid manure is generally considered to imply the drainings of dung heaps, stables, &c., and it chiefly consists of urine, together with the excrements of animals dissolved by it or by rain. When properly diluted it is very useful in gardening, as it contains the fertilising properties in a liquid state, and is readily taken up by the spongioles of plants. Dung, in most cases, can only be applied before the crop is planted, but liquid manure can be applied at any time during the growth of plants, and it has this advantage, that it can be applied strong or weak, as the condition of the plant requires it. Horse dung is most beneficial on cold stiff soils, and in order that its mechanical action may be turned to advantage the dung should not be much decomposed. Too much fermentation drives out the ammonia. It is well adapted for producing immediate action on crops. Of equal weights of horse and cow dung, the former is the more fertilizing; but taking bulk for bulk of each, it is inferior to cow dung. Cow dung is excellent for dry, hot soils, and for mulching the roots of fruit trees, but only after fermentation is it fit for close contact with vegetation. Pig dung, in an unmixed state, is too strong for vegetation, but when mixed with litter and as much earth as will moderate fermentation it becomes an excellent manure. Composts are mixtures of various earths or manures. Their number may be said to be infinite, and they are of the greatest utility. In general, the best way of economising all sorts of refuse is to form it into a compost. At the same time lime should never be introduced into composts with substances containing ammonia or producing it in the decomposition. Flesh, hair, feathers, pond mud, ditch screenings, and numerous other kinds of animal and vegetable refuse may all be advantageously employed as manure.—Mr. Loller said they could realise from the paper that almost everything could be turned into manure, and on many of their farms first-class material for manure was going to waste for want of a little forethought. The speaker dwelt at some length on the material in households that would make first-class manures which was thrown away. They wanted a manure pit and the use of deodorizers to make this waste material into the finest manures. All that was required was to put systematically a little earth on it. He knew from experience that sawdust was one of the best things for absorbing liquid manure, and rendering it usable to the best advantage. The Chairman (Mr. Holmes) inquired if eucalyptus leaves could be utilized as manure. Mr. Johnstone said they could not be so utilized. There were leaves of certain trees, such as the cedar, pine, and myrtle, which were of no value for making manure. Mr. Rogers inquired if it would pay to plough in a green crop of peas, say, running 15bush. to the acre, as a manure. Mr. Johnstone said it never paid to plough in green feed as a manure. They should always feed off, for thereby they were growing beef and mutton, and also manuring the ground. If they desired to improve their land with a green crop, it would be better to fence portions off temporarily with hurdles, and feed it off in sections, in a similar way as they feed off turnips and mangolds. By that means they would retain the nitrogen in the soil, in the case of peas, as the roots would remain in it. In case of very poor soil, they might plough in a green crop, because it was deficient in humus, and the green feed would supply this deficiency, and therefore greatly improve the soil; but with ordinary land he would say feed off the green crop instead of ploughing it in to improve the land.—Mr. Loller exhibited some excellent pears of the Vicar of Wingfield variety.

## SANDALWOOD.

June 9th.—Present: 14 members and one visitor.

Farm Management.—Mr. J. W. Collins read a short paper on this subject. He said a man working a mallee block needed at least four or five good working horses. He should have the necessary implements, but a good 1-furrow plough and tip-dray would suit the beginner in a small way. Drill, binder, harvester, and harrows were also essential. The land should be ploughed and prepared for seeding during May, and be given a light sowing, and as much super. as one could afford. Every beginner should aim at having a stack of hay. Horses required special attention in that locality, and should be well rugged or housed and carefully fed. The chief object was to get one's land as clean as possible. A good discussion followed, after which the election of officers took place.

MILLICENT, May 19th.—Noxious Weeds.—A good deal of attention was directed to the question of noxious weeds growing in the district. Various useless weeds were mentioned by Mr. Bowering. Mr. Holzgrefe thought the most troublesome weed met with in the district was the star thistle. Mr. Mitchell thought the pest could be overcome if landholders would realise its seriousness. He suggested that the district council might pay the landholders a small sum for clearing the roads adjoining their respective properties.

SANDALWOOD, May 14th.—Farming in mallee soils was the subject of discussion brought forward by Mr. Wattchow. He pointed out the necessity for doing all that was possible to ensure a good burn, and to work the land for seeding with light skim ploughs, share implements in preference to disk. The speaker recommended fallowing to a depth of 3in. to 4in. as being best suited to mallee land. Members in general agreed with the speaker's views.

I. A. R. I. 75.

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